

Bench-Scale Liner Compatibility Study for the Impoundment 8 Facility, American Cyanamid Superfund Site, Bridgewater, New Jersey

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This bench-scale liner compatibility study was conducted on behalf of Wyeth Holdings LLC in support of the Focused Feasibility Study (FFS) for Operable Unit 8 (OU8) (Impoundments 1 and 2) at the American Cyanamid Superfund Site in Bridgewater, New Jersey (Site). Several remedial alternatives are under evaluation as part of the FFS process and include the potential use of the Impoundment 8 Facility corrective action management unit (CAMU) for final deposition of treated materials from Impoundments 1 and 2.

Specifically, this study was conducted to test the compatibility of the high-density polyethylene (HDPE) geomembrane, which lines the CAMU, with simulated leachate generated from treated impoundment material from the 2014 OU8 pilot study. The bench-scale study approach and methods are detailed in the *FFS Work Plan Addendum* (CH2M HILL [CH2M] 2015a) and the *Amendment to the Bench-Scale Testing Plan* (CH2M 2015b).

Executive Summary

Liner compatibility testing was conducted on HDPE geomembrane matching the material used in lining the CAMU. The tests were conducted in accordance with American Society for Testing and Materials (ASTM) procedures using two simulated leachates – Leachate A (“high batch”) and Leachate B (“low batch”). Concentrations of constituents of concern (COCs) were maintained close to target levels in the test tanks to simulate reoccurring leachate exposure to the geomembrane liner. Statistical evaluations were conducted on the mechanical testing results, and no patterns of increase or decrease in material properties with exposure time were found for liner material exposed to Leachate A or Leachate B.

The results of the bench-scale study indicate that HDPE liner material similar to that used in the Impoundment 8 Facility CAMU is compatible with leachates potentially generated from treated OU8 material, even under high leachate concentration scenarios.

Background

The Impoundment 8 Facility CAMU was constructed in stages beginning in 1991 and was designated as a CAMU by the United States Environmental Protection Agency (USEPA) and the New Jersey Department of Environmental Protection (NJDEP) in 1996. It is composed of four operating cells – Cells 1 through 4. Cells 1 and 2 were constructed in 1991 and 1995, respectively. Cells 3 and 4 were constructed in 1998.

The cell designs incorporate a composite HDPE geomembrane liner system (primary and secondary liners). Each cell is equipped with individual leachate collection and leak detection systems. Cells 3 and 4 may potentially be used for placement of the treated material from OU8. The specific treatment program and deposition endpoint for OU8 treated materials have not yet been selected. Therefore, this liner compatibility study was conducted using a range of simulated leachate concentrations to evaluate the potential effects of placing treated OU8 materials in the Impoundment 8 Facility CAMU.

Testing Program Setup

Compatibility testing consisted of immersing liner coupons in leachate generated from solid-phase treated materials. The coupons were tested over 120 days to assess changes in physical and mechanical properties of the geomembrane. The influence of leachate on the liner material was tested using ASTM standardized methods. Details are provided here on the following elements of the testing program:

- Liner material acquisition and coupon generation
- Leachate generation from treated impoundment materials
- Compatibility testing of the liner material
- Chemical control study to evaluate leachate concentration changes during the bench-scale study

Liner Material Acquisition and Coupon Generation

The liner material that was tested for this study matches the liner product used in the construction of the Cells 3 and 4 bottom liners of the CAMU. Virgin HDPE geomembrane (AGRU 60-mil HDPE Micro Spike liner) was shipped from Northwest Linings Inc., a liner supplier and installer, to TRI Environmental Inc. (TRI), a geosynthetics testing firm located in Austin, Texas. Upon receipt, the material was logged, conditioned in the laboratory (bringing to laboratory temperature and humidity), and prepared by cutting it into 8-inch by 10-inch coupons for use in the compatibility test. Sets of four coupons were then drilled and clipped together for each of the benchmark time pulls.

Leachate Generation from Treated Impoundment Materials

The *FFS Work Plan Addendum* (CH2M 2015a) originally specified that the compatibility tests would be conducted using leachates from treated materials generated during the 2014 pilot study in order to simulate the range of leachate concentrations potentially generated from treated material placed in the Impoundment 8 Facility CAMU. These consisted of treated materials from Caisson 1, where in-situ solidification/stabilization (ISS) was applied, and Caisson 2, where in-situ thermal treatment (ISTT) was applied. However, when the material from Caissons 1 and 2 was collected in September 2015 to generate leachate for this study, chemical screening results showed that COC concentrations were much lower than the 2014 pilot study results. To better simulate a range of possible liner-exposure scenarios, the leachate generated from Caisson 2 (which exhibited the highest COC concentrations during the September 2015 chemical screening tests) was spiked with pure, laboratory-grade chemical stocks to bring the COC concentrations up to comparable levels observed in synthetic precipitation leaching procedure (SPLP) samples collected during the 2014 pilot study.

Two 30-gallon batches of leachate were generated from the Caisson 2 material. The leachate was first generated using USEPA Method 1312, SPLP (USEPA 1994), analyzed for COC concentrations, and then shipped in laboratory-certified clean carboys to TRI where the compatibility testing was performed.

Leachate Spiking and Confirmatory Testing

Before initiating compatibility testing, TRI spiked the leachate in the test tanks to achieve target concentrations that were observed in the 2014 OU8 pilot study for material treated by ISS and ISTT.

These target concentrations were established for seven COCs as shown in Table 1 (also shown are Henry's Law constants for each COC). Two sets of target concentrations were created. Concentrations for Leachate A were selected to simulate leachate from material treated by ISS only (Caisson 1), and concentrations for Leachate B were chosen to simulate leachate from material treated by ISTT only (Caisson 2). In general, with the exception of acetophenone, target COC concentrations for Leachate A ("high batch") were higher than Leachate B ("low batch"), and naphthalene had the same target concentrations in both leachates.

Table 1. COC Target Concentrations for Leachate A and Leachate B and Henry's Law Constants

	Target Concentration (µg/L)		Henry's Law Constant ^a (kPa m ³ /mol)
	Leachate A "High Batch"	Leachate B "Low Batch"	
Acetone*	3,000	500	0.004
Benzene*	500,000	100,000	0.588
1,2-Dichlorobenzene *	2,000	1,000	0.147
Naphthalene	2,000	2,000	0.048
Toluene*	50,000	15,000	0.667
Xylene*	3,000	2,000	0.417 - 0.714
Acetophenone	2,000	8,000	0.001
Total Volatile Organic Compounds	558,000	118,500	-

^a Source: Sander (2015)

* Included in total volatile organic compounds calculation.

µg/L – micrograms per liter

kPa m³/mol – kilopascal cubic meter per mole

Following the spiking step, leachate samples were collected and shipped to Accutest Laboratories in Dayton, New Jersey (Accutest) to confirm that the target concentrations were reached. The leachate tanks were also sampled periodically during bench-scale testing to monitor COC concentration changes over time. Re-spiking was performed as needed following sampling to maintain target concentrations over the 120-day compatibility testing period.

Compatibility Testing

Liner compatibility testing was performed following ASTM D5322 – *Standard Practice for Laboratory Immersion Procedures for Evaluating the Chemical Resistance of Geosynthetic to Liquids* (ASTM 2009), ASTM D5747 – *Standard Practice for Tests to Evaluate the Chemical Resistance of Geomembranes to Liquids* (ASTM 2008), and in accordance with the *Amendment to the Bench-Scale Testing Plan* (CH2M 2015b).

Each test was set up in 11.75-inch-wide by 11.75-inch-long by 11.75-inch-deep glass tanks containing approximately 26.6 liters of leachate (Figure 1). Tests included immersing the HDPE geomembrane coupons (twenty 8-inch by 10-inch coupons in each tank, each coupon weighing on average approximately 80 grams before immersion) containing either Leachate A or Leachate B. The tanks were capped with a glass top and sealed with vacuum grease. Tests were run at room temperature, and Leachate A had a pH = 1.8 and Leachate B had a pH = 3.3. A set of four coupons was removed from each tank at intervals of 30, 60, 90, and 120 days and tested for physical and mechanical properties. One set of extra coupons was provided in each of the two tanks for a total of five sets.



Figure 1. Compatibility Testing Tank
Cube-shaped glass tank containing leachate and liner coupons.

ASTM D5747 specifies the number of required and optional (but recommended) tests based on the type of liner material to be tested. Table 2 presents the tests performed along with the test methods.

Table 2. Physical and Mechanical Compatibility Tests

Property	Test Method	Units
<i>Required (All Geomembranes):</i>		
Weight Change	USEPA/600/2-88/052	g, %change
Dimensional Changes		
<i>Thickness</i>	D638 or D5199	mm, %change
<i>Length and Width</i>	USEPA/600/2-88/053	mm, %change
Volatile Loss	USEPA/600/2-88/054 Appendix G	g, %change
Visual Observation		
<i>Required (Group I - HDPE Geomembrane)</i>		
Tensile Properties	ASTM D6693 Type IV	kN/m
<i>Yield Strength</i>		
<i>Break Strength</i>		
<i>Yield Elongation</i>		
<i>Break Elongation</i>		
Tear Resistance	ATSM D1004	N/mm
Puncture	ASTM D4833 /4833M	N/mm
2% Secant Modulus	ASTM D5323	
Hardness	ASTM D2240 Type D	

Table 2. Physical and Mechanical Compatibility Tests

Property	Test Method	Units
Extractable Content	Appendix E of USEPA/600/2-88/052	
Density ^a	ASTM D792	g/cc
Recommended:		
Hydrostatic Resistance (Mullen Burst)	ASTM D751 Method A, Procedure 1	N/mm

^a Based on best industry practices and as specified in the *FSS Work Plan Addendum* (CH2M 2015a), an older and previously approved standard test method for density (ASTM D792) was substituted for the ASTM D5747 recommended procedure. This method has been demonstrated to be a more accurate method for determining density.

% - percent

ASTM – American Society for Testing and Materials

g – grams

g/cc – grams per cubic centimeter

HDPE – high-density polyethylene

kN/m – kilonewtons per meter

mm - millimeter

N/mm – newtons per millimeter

USEPA – United States Environmental Protection Agency

At each test interval, the glass tank lid was removed, a set of four coupons were pulled, aqueous samples were collected and sent to Accutest for COC concentration testing, and the lid was reset. Once the aqueous analytical results were received, each tank was re-spiked as needed to the target concentrations (and periodically resampled to confirm target concentrations were achieved). After the coupons were removed from the tanks, they were cut down to specimen sizes for individual physical and mechanical testing.

Chemical Control Study

During the compatibility testing, monitoring of COC concentrations in the leachate indicated there were some losses of COCs in the leachate over time. To determine whether these changes were due to sorption by the HDPE liner coupons, volatilization, or both, a control study was conducted. The control study consisted of setting up two tanks, one with coupons and one without coupons and monitoring volatile organic compound (VOC) concentrations over time. Target concentrations for the control study were the same as Leachate A (“high batch”, Table 1), with the exception of acetophenone, which was not included because the control study focused on VOCs only. In addition, the volume needed for chemical analysis of acetophenone is relatively large and would result in significant liquid volume losses in the control tanks, and acetophenone losses were relatively insignificant during the compatibility study. VOC concentrations were higher in Leachate A than Leachate B, so the concentrations in the control best represented the higher exposure scenario of Leachate A.

Figure 2 shows the control tank setup. Two control experiments were run – Control 1 (C-1) contained liner coupons, while Control 2 (C-2) did not. The experimental setup was smaller than the tanks used in compatibility testing but maintained a proportional coupon mass to leachate volume ratio (approximately 60 grams of geomembrane per liter of liquid). The controls were evaluated over 59 days with one spike event at Day 9 to reach target VOC concentrations. The coupons were placed in the leachate on Day 0 (before the spiking event).



Figure 2. Control Study Setup

Left: Control 1 "C-1" (with liner coupons); Right: Control 2 "C-2" (without liner coupons).

Test Results and Evaluation

A summary of the test results is provided for the following test components:

- Assessment of aqueous chemical concentrations in leachate over time in compatibility tests and control tests
- Physical property assessment of the HDPE liner coupons before and after exposure
- Mechanical property assessment of the HDPE liner coupons before and after exposure

Also provided are a statistical evaluation of the compatibility data (physical and mechanical property data) and a comparison of the compatibility results to acceptance criteria.

Chemical Concentrations in the Tanks/Control Study

During the 120-day compatibility testing, COC concentrations in the leachate were monitored following each test interval and adjusted as needed to maintain concentrations near the target levels (analytical laboratory reports are provided in Attachment 1). The purpose was to simulate field conditions where leachate is continually being refreshed with precipitation and coming into contact with the liner system. When COC concentrations decreased below the target values in the test tanks, re-spiking of the deficient COCs was performed following the liner testing intervals after analytical test results were provided (spiking on Days 10, 43, 70, and 100 for test Day 0, Day 30, Day 60, and Day 90, respectively). It was observed that some COCs exhibited high losses in concentration over time, while others did not (Figures A2-1 through A2-8 of Attachment 2). In general, COCs with higher Henry's Law constants (Table 1) showed greater losses than those with lower Henry's Law constants, suggesting that losses due to volatilization was likely a contributing factor. To assess the extent of the loss due to volatilization and/or sorption, the control study was conducted.

Figure 3 shows the control results for two representative VOCs, benzene and 1,2-dichlorobenzene (1,2-DCB). Measured concentrations of VOCs were lower in C-1 (with coupons), than C-2 (without coupons), even though each control tank was spiked with sufficient chemical mass to reach the target concentrations. The lower concentrations in C-1 are indicative of VOC losses associated with sorption of COCs onto and into the coupons, which appears to be more pronounced early in the control study shortly after spiking. Based on the favorable material properties testing results, the observed VOC sorption does not appear to have affected the overall test. Additional VOC loss observed later in the control study appears to be associate with volatilization, which is not surprising given that the test is

being run at ambient temperature conditions. A comprehensive summary of control study results is provided in Attachment 3.

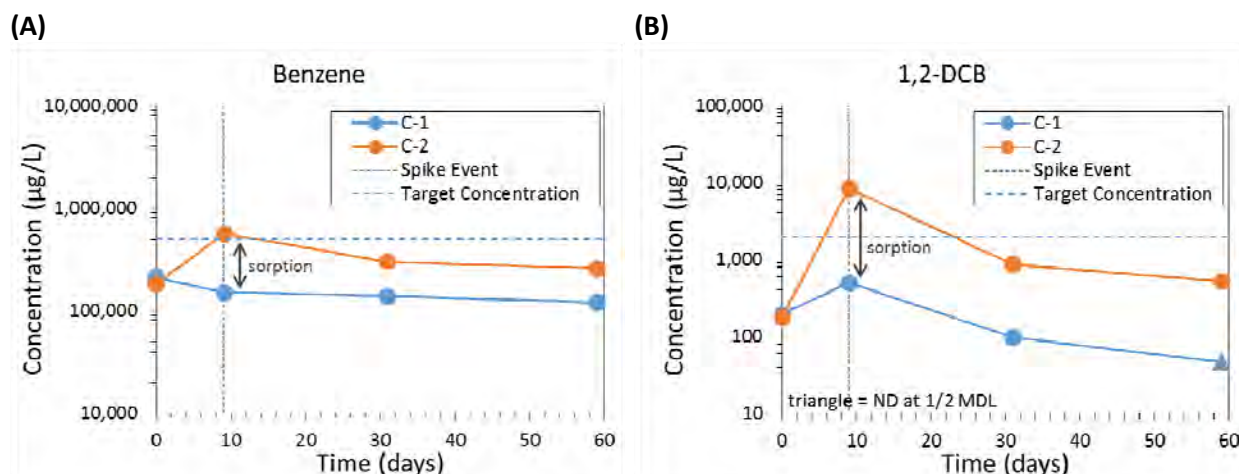


Figure 3. Representative Control Study Concentration Time-series Plots
(A) Benzene and (B) 1,2-DCB Concentrations in Controls.

Statistical Evaluation of Data

Changes in coupon physical and mechanical properties were measured after exposure to Leachate A and Leachate B at Days 30, 60, 90, and 120 as compared to the baseline. A statistical analysis was performed to determine if the results from different exposure intervals were statistically different from one another. These temporal differences were evaluated using analysis of variance (ANOVA) applied with a nonparametric approach (based on ranks of the data). When significant differences were determined to exist in the initial testing phase a *post hoc* test using Tukey multiple comparisons followed to determine which results were or were not statistically different from one another. A review of this statistical analysis did not identify consistent patterns of increases or decreases in material properties with exposure time for coupons exposed to either Leachate A or Leachate B. Attachment 4 describes the details of the statistical methods.

Physical Properties

The primary physical properties tested were thickness, length, width, and mass. Attachment 5 presents the complete laboratory test reports. Physical properties of each coupon were measured at each time interval using coupons exposed to simulated leachate for the specified time interval. The difference in these results and those of the unexposed (baseline) coupons was used to determine the percent change from baseline. Figure 4 provides a summary of the percent change in physical properties over time for Leachate A and Leachate B. In general, less change is noted in coupons exposed to Leachate B than Leachate A. In both cases, however, the percent change was less than ± 2 percent for thickness and less than approximately ± 0.5 percent for all other properties. As discussed in the "Acceptance Criteria Evaluation" section below, the mass change results (the only physical property for which acceptance criteria are suggested) are within the range of acceptability (less than 2 percent change) and indicate that the leachate is compatible with the liner tested.

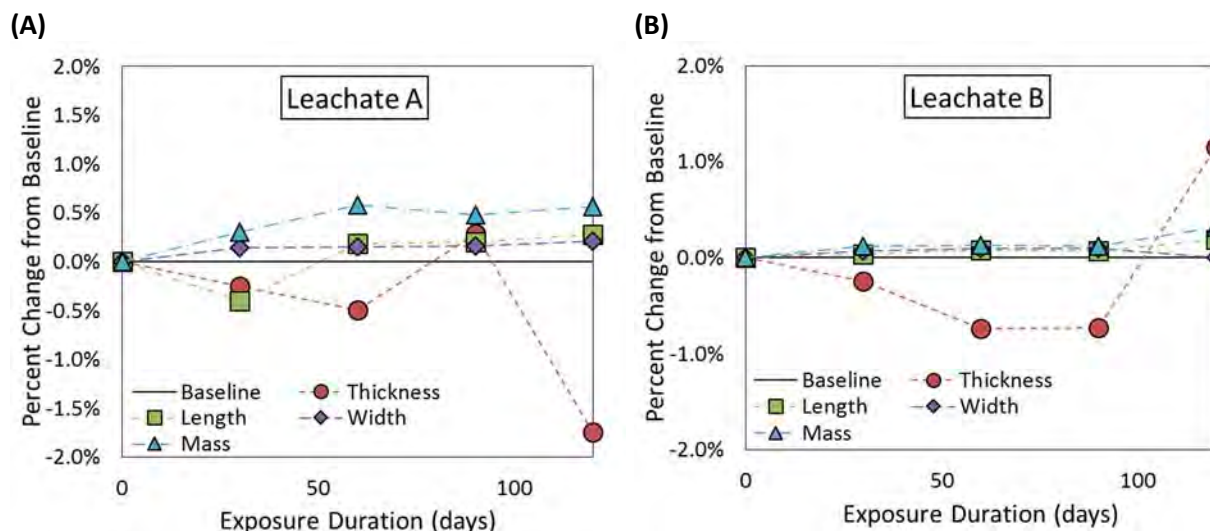


Figure 4. Changes in Physical Properties with Exposure Time
Changes in coupon thickness, length, width, and mass following exposure to (A) Leachate A and (B) Leachate B.

In addition to the physical properties discussed above, the change in VOC content was also measured. Attachment 5 and Figure 5 provide the laboratory test results. For this analysis, four replicate analyses were run on unexposed (baseline) liner coupons, and two replicates were run on coupons exposed to each leachate at each testing interval. Even for Leachate A ("high batch"), the percent change from baseline did not exceed 0.5 percent. The volatiles content in Leachate A was greater than Leachate B, which is expected given the larger mass of chemicals that were lost by sorption into and/or onto the geomembrane. This is also reflected in the larger amount of chemical quantities that were spiked and re-spiked in Leachate A compared to Leachate B to reach target concentrations. Although the data indicate additional sorption of VOC mass associated with Leachate A, this sorption does not appear to significantly affect the physical properties of the liner (as discussed below).

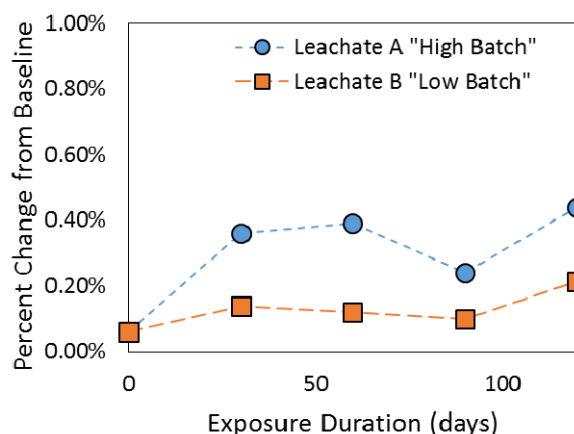


Figure 5. Changes in Volatiles Content with Exposure Time
For Leachate A ("high batch") and Leachate B ("low batch").

Mechanical Properties

A summary of the mechanical property testing results are presented below. Attachment 5 provides the complete laboratory test reports. Mechanical properties were measured on unexposed liner material (baseline) and coupons exposed to leachate at each of the time intervals (Days 30, 60, 90, and 120).

- **Tensile properties.** Tensile properties evaluated were yield strength, break strength, yield elongation, and break elongation in both the machine direction (MD) and transverse direction (TD). Attachment 5 graphically summarizes MD tensile stress at yield, MD elongation at yield, MD tensile stress at break, and MD elongation at break. These figures show that for all exposure intervals, average measurements for coupons exposed to Leachate A and Leachate B were above the manufacturer's (AGRU's) minimum average. As shown in Table 3, the average percent change from baseline results measured in either the MD or TD at all time intervals are within the range of acceptability and indicate that the leachate is compatible with the liner tested. Additionally, each individual percent change value used to calculate the average met the acceptability criterion.
- **Tear resistance.** Attachment 5 graphically summarizes the results for MD tear resistance. For all exposure intervals, the average MD tear resistance was greater than the geomembrane manufacturer's minimum average value with no recognizable pattern of increasing or decreasing tear resistance over time.. No consistent pattern of increasing or decreasing tear resistance over time was observed in either leachate. As shown in Table 3 and discussed in the "Acceptance Criteria Evaluation" section below, the measured percent change from baseline results are within the range of acceptability and indicate that the leachate is compatible with the liner tested. Additionally, each individual percent change value used to calculate the average met the acceptability criterion.
- **Puncture resistance.** Attachment 5 graphically summarizes the puncture resistance results. For most exposure intervals, the average puncture resistance was greater than the manufacture's minimum average value. The average puncture resistance for coupons exposed to Leachate A for 120 days was at the manufacture's minimum average value. No consistent pattern of increasing or decreasing puncture resistance over time was observed for either leachate. As shown in Table 3 and discussed in the "Acceptance Criteria Evaluation" section below, the measured percent change from baseline results are within the range of acceptability and indicate that the leachate is compatible with the liner tested. Additionally, each individual percent change value used to calculate the average met the acceptability criterion.
- **Modulus of elasticity.** Attachment 5 graphically summarizes the 2 percent secant modulus of elasticity results. No consistent pattern of increase or decrease over time was observed. As shown in Table 3 and discussed in the "Acceptance Criteria Evaluation" section below, the percent change from baseline results are within the range of acceptability and indicate that the leachate is compatible with the liner tested. Additionally, each individual percent change value used to calculate the average met the acceptability criterion.
- **Indentation hardness.** The range of percent change in indentation hardness from baseline evaluated at each time interval was -7 to -1 percent for Leachate A and -5 to -2 percent for Leachate B. No consistent pattern of increasing or decreasing indentation hardness with time was observed. As discussed in the "Acceptance Criteria Evaluation" section below, these results are within the range of acceptability and indicate that the leachate is compatible with the liner tested.
- **Extractable content.** The percent extractables varied from an average of 0.11 percent in baseline samples to a range of 0.10 to 0.34 percent in exposed coupons. Percent change was not reported. No consistent increase or decrease in percent extractables with exposure time was observed. As

discussed in the “Acceptance Criteria Evaluation” section below, these results are within the range of acceptability and indicate that the leachate is compatible with the liner tested.

- **Density.** The range of percent change in density from baseline evaluated at each time interval was -0.064 to 0.042 percent for Leachate A and -0.085 to 0 percent for Leachate B. No consistent pattern of increasing or decreasing density over time was observed. As discussed in the “Acceptance Criteria Evaluation” section below, these results are within the range of acceptability and indicate that the leachate is compatible with the liner tested.
- **Hydrostatic resistance.** Attachment 5 graphically summarizes the results for hydrostatic resistance. The measured percent change from baseline varied from 0 to 8 percent for Leachate A and 6 to 10 percent for Leachate B. No consistent pattern of increase or decrease with time was observed. As discussed in the “Acceptance Criteria Evaluation” section below, these results are within the range of acceptability and indicate that the leachate is compatible with the liner tested.

Acceptance Criteria Evaluation

Table 3 provides a summary of industry best practices for compatibility testing acceptance criteria for HDPE geomembrane, which presents selected test properties and criteria for resistance based on industry publications (Koerner 2005; National Sanitation Foundation [NSF] 1987). Comparing the changes observed during this bench-scale study to the suggested criteria, the percent change from baseline results for all test properties pass the criteria (that is, considered “acceptable”).

Table 3. Acceptance Criteria and Comparison to Results

Comparison of suggested resistance criteria to the range of results reported to various test properties

Test Property	Suggested Criteria for Acceptance (% Change) ^a		Criteria Met? (Yes/No) (Average Observed % Change) ^b		
	Koerner (2005) ^c	NSF (1987) ^d	Direction	Leachate A	Leachate B
Weight change	< 2 increase	< 3 increase	---	Yes (0.48)	Yes (0.17)
Tensile strength at break	---	< 20 decrease	MD	Yes (7)	Yes (23)
			TD	Yes (4)	Yes (6)
Elongation at break	---	< 20 decrease	MD	Yes (-2)	Yes (-3)
			TD	Yes (5)	Yes (5)
Tensile strength at yield	< 20 decrease	< 20 decrease	MD	Yes (-3)	Yes (-1)
			TD	Yes (-1)	Yes (3)
Elongation at yield	< 30 decrease	< 20 decrease	MD	Yes (14)	Yes (21)
			TD	Yes (-1)	Yes (-9)
Tear resistance	< 20 decrease	< 20 decrease	MD	Yes (3)	Yes (13)
			TD	Yes (6)	Yes (8)
Puncture	< 30 decrease	---	---	Yes (-2)	Yes (1)
Modulus	< 30 decrease	< 30 decrease	MD	Yes (-4)	Yes (2)
			TD	Yes (2)	Yes (8)

^a Acceptance criteria (% increase and % decrease) are relative to respective baseline

^b The value shown in parentheses represents the average increase (positive) or decrease (negative) in observed percent change from baseline and is averaged over the four test intervals (30, 60, 90, and 120 days). Whether or not the criteria was met was determined by considering the average percent change compared to the acceptance criteria both in magnitude and direction.

^c For semi-crystalline polymers (such as high-density polyethylene [HDPE]).

^d For HDPE geomembrane.

% - percent

NSF - National Sanitation Foundation

Conclusions

The results of this bench-scale study indicate the Impoundment 8 Facility CAMU liner material is compatible with leachates expected to be generated from treated OU8 material, even under high leachate concentrations, which simulate leachate generated from post ISS only treated material. Physical and mechanical testing results show no discernable patterns of property degradation over time. In addition, the percent change in physical properties was minimal, and the percent change in mechanical properties was within suggested acceptance criteria.

References

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Attachment 1

Accutest Laboratory Reports

Technical Report for

CH2M Hill

OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ

477213

SGS Accutest Job Number: JC8154

Sampling Date: 11/09/15

Report to:

CH2M Hill

Alexandra.SalterBlanc@ch2m.com

ATTN: Alexandra SalterBlanc

Total number of pages in report: **13**



Test results contained within this data package meet the requirements
of the National Environmental Laboratory Accreditation Program
and/or state specific certification programs as applicable.



Nancy Cole
Laboratory Director

Client Service contact: Marty Vitanza 732-329-0200

Certifications: NJ(12129), NY(10983), CA, CT, DE, FL, IL, IN, KS, KY, LA, MA, MD, MI, MT, NC,
OH VAP (CL0056), AK (UST-103), AZ (AZ0786), PA, RI, SC, TN, TX, VA, WV, DoD ELAP (L-A-B L2248)

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Test results relate only to samples analyzed.

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Sample Summary

CH2M Hill

Job No: JC8154

OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ
Project No: 477213

Sample Number	Collected		Received	Matrix		Client Sample ID
	Date	Time By		Code	Type	
JC8154-1	11/09/15	16:00 JN	11/10/15	AQ	Water	LEACHATE A-PRESPIKE
JC8154-2	11/09/15	16:15 JN	11/10/15	AQ	Water	LEACHATE B-PRESPIKE

Summary of Hits

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Job Number: JC8154
Account: CH2M Hill
Project: OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ
Collected: 11/09/15

Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
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JC8154-1 LEACHATE A-PRESPIKE

Acetone	926	500	170	ug/l	SW846 8260C
Benzene	28900	130	59	ug/l	SW846 8260C
1,2-Dichlorobenzene	76.0	50	9.3	ug/l	SW846 8260C
Naphthalene	198 J	250	10	ug/l	SW846 8260C
Toluene	2680	50	8.1	ug/l	SW846 8260C
Xylene (total)	199	50	8.3	ug/l	SW846 8260C
Acetophenone	5250	200	36	ug/l	SW846 8270D

JC8154-2 LEACHATE B-PRESPIKE

Acetone	142 J	200	66	ug/l	SW846 8260C
Benzene	8700	50	24	ug/l	SW846 8260C
1,2-Dichlorobenzene	75.7	20	3.7	ug/l	SW846 8260C
Naphthalene	193	100	4.0	ug/l	SW846 8260C
Toluene	1170	20	3.2	ug/l	SW846 8260C
Xylene (total)	117	20	3.3	ug/l	SW846 8260C
Acetophenone	6600	200	36	ug/l	SW846 8270D

Sample Results

Report of Analysis

Report of Analysis

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Client Sample ID:	LEACHATE A-PRESPIKE		
Lab Sample ID:	JC8154-1	Date Sampled:	11/09/15
Matrix:	AQ - Water	Date Received:	11/10/15
Method:	SW846 8260C	Percent Solids:	n/a
Project:	OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	U200684.D	50	11/12/15	NH	n/a	n/a	VU9240
Run #2	U200658.D	250	11/11/15	NH	n/a	n/a	VU9239

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	926	500	170	ug/l	
71-43-2	Benzene	28900 ^a	130	59	ug/l	
95-50-1	1,2-Dichlorobenzene	76.0	50	9.3	ug/l	
91-20-3	Naphthalene	198	250	10	ug/l	J
108-88-3	Toluene	2680	50	8.1	ug/l	
1330-20-7	Xylene (total)	199	50	8.3	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	98%	99%	76-120%
17060-07-0	1,2-Dichloroethane-D4	106%	105%	73-122%
2037-26-5	Toluene-D8	98%	98%	84-119%
460-00-4	4-Bromofluorobenzene	96%	97%	78-117%

(a) Result is from Run# 2

ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

Report of Analysis

Page 1 of 1

Client Sample ID:	LEACHATE A-PRESPIKE	Date Sampled:	11/09/15
Lab Sample ID:	JC8154-1	Date Received:	11/10/15
Matrix:	AQ - Water	Percent Solids:	n/a
Method:	SW846 8270D SW846 3510C		
Project:	OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	5P23087.D	1	11/11/15	AP	11/11/15	OP88863	E5P1177
Run #2	5P23119.D	100	11/12/15	SD	11/11/15	OP88863	E5P1178

	Initial Volume	Final Volume
Run #1	1000 ml	1.0 ml
Run #2	1000 ml	1.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
98-86-2	Acetophenone	5250 ^a	200	36	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	34%	0% ^b	14-88%
4165-62-2	Phenol-d5	24%	0% ^b	10-110%
118-79-6	2,4,6-Tribromophenol	56%	0% ^b	39-149%
4165-60-0	Nitrobenzene-d5	68%	0% ^b	32-128%
321-60-8	2-Fluorobiphenyl	52%	0% ^b	35-119%
1718-51-0	Terphenyl-d14	30%	0% ^b	10-126%

(a) Result is from Run# 2

(b) Outside control limits due to dilution.

ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

Report of Analysis

Page 1 of 1

Client Sample ID:	LEACHATE B-PRESPIKE			Date Sampled:	11/09/15
Lab Sample ID:	JC8154-2			Date Received:	11/10/15
Matrix:	AQ - Water			Percent Solids:	n/a
Method:	SW846 8260C				
Project:	OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ				

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	U200683.D	20	11/12/15	NH	n/a	n/a	VU9240
Run #2	U200657.D	100	11/11/15	NH	n/a	n/a	VU9239

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	142	200	66	ug/l	J
71-43-2	Benzene	8700 ^a	50	24	ug/l	
95-50-1	1,2-Dichlorobenzene	75.7	20	3.7	ug/l	
91-20-3	Naphthalene	193	100	4.0	ug/l	
108-88-3	Toluene	1170	20	3.2	ug/l	
1330-20-7	Xylene (total)	117	20	3.3	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	99%	98%	76-120%
17060-07-0	1,2-Dichloroethane-D4	107%	106%	73-122%
2037-26-5	Toluene-D8	97%	96%	84-119%
460-00-4	4-Bromofluorobenzene	94%	98%	78-117%

(a) Result is from Run# 2

ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

Report of Analysis

Page 1 of 1

Client Sample ID:	LEACHATE B-PRESPIKE			Date Sampled:	11/09/15
Lab Sample ID:	JC8154-2			Date Received:	11/10/15
Matrix:	AQ - Water			Percent Solids:	n/a
Method:	SW846 8270D SW846 3510C				
Project:	OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ				

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	5P23088.D	1	11/11/15	AP	11/11/15	OP88863	E5P1177
Run #2	5P23120.D	100	11/12/15	SD	11/11/15	OP88863	E5P1178

	Initial Volume	Final Volume
Run #1	1000 ml	1.0 ml
Run #2	1000 ml	1.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
98-86-2	Acetophenone	6600 ^a	200	36	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	43%	0% ^b	14-88%
4165-62-2	Phenol-d5	31%	0% ^b	10-110%
118-79-6	2,4,6-Tribromophenol	67%	0% ^b	39-149%
4165-60-0	Nitrobenzene-d5	91%	0% ^b	32-128%
321-60-8	2-Fluorobiphenyl	63%	0% ^b	35-119%
1718-51-0	Terphenyl-d14	46%	0% ^b	10-126%

(a) Result is from Run# 2

(b) Outside control limits due to dilution.

ND = Not detected MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

N = Indicates presumptive evidence of a compound



Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody



PN

PAGE 1 OF 1

4.4

JC8154: Chain of Custody

Page 1 of 3

Accutest Laboratories Sample Receipt Summary

Accutest Job Number: JC8154 **Client:** CH2MHILL **Project:** American Cyanamid
Date / Time Received: 11/10/2015 10:15:00 AM **Delivery Method:** FedEx **Airbill #s:** 651491627944

Cooler Temps (Raw Measured) °C: Cooler 1: (5.3);
 Cooler Temps (Corrected) °C: Cooler 1: (5.5);

<u>Cooler Security</u>	<u>Y or N</u>	<u>Y or N</u>
1. Custody Seals Present:	<input checked="" type="checkbox"/> <input type="checkbox"/>	3. COC Present: <input checked="" type="checkbox"/> <input type="checkbox"/>
2. Custody Seals Intact:	<input checked="" type="checkbox"/> <input type="checkbox"/>	4. Smpl Dates/Time OK <input checked="" type="checkbox"/> <input type="checkbox"/>

<u>Cooler Temperature</u>	<u>Y or N</u>
1. Temp criteria achieved:	<input checked="" type="checkbox"/> <input type="checkbox"/>
2. Cooler temp verification:	IR Gun
3. Cooler media:	Ice (Bag)
4. No. Coolers	1

<u>Quality Control Preservation</u>	<u>Y</u>	<u>N</u>	<u>N/A</u>
1. Trip Blank present / cooler:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. Trip Blank listed on COC:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. Samples preserved properly:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
4. VOCs headspace free:	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

<u>Sample Integrity - Documentation</u>	<u>Y</u>	<u>or</u>	<u>N</u>
1. Sample labels present on bottles:	<input checked="" type="checkbox"/>		<input type="checkbox"/>
2. Container labeling complete:	<input type="checkbox"/>		<input checked="" type="checkbox"/>
3. Sample container label / COC agree:	<input checked="" type="checkbox"/>		<input type="checkbox"/>

<u>Sample Integrity - Condition</u>	<u>Y</u>	<u>or</u>	<u>N</u>
1. Sample recvd within HT:	<input checked="" type="checkbox"/>		<input type="checkbox"/>
2. All containers accounted for:	<input checked="" type="checkbox"/>		<input type="checkbox"/>
3. Condition of sample:			Intact

<u>Sample Integrity - Instructions</u>	<u>Y</u>	<u>N</u>	<u>N/A</u>
1. Analysis requested is clear:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
2. Bottles received for unspecified tests	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
3. Sufficient volume recvd for analysis:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
4. Compositing instructions clear:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5. Filtering instructions clear:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Comments
 1) -1,-2: 3 of 3 voa vials rec'd with macro bubbles, no screens provided.
 2) -2: No labels on voa vials, set up by process of elimination.



Sample Receipt Summary - Problem Resolution

Accutest Job Number: JC8154

Initiator: daveh

CSR: MV

Response Date: 11/10/2015

Response: Proceed as noted:
Please provide one vial as a Screen.- Does not matter which vial is selected.

Lab will be provided with estimated concentrations as to what to expect when running these samples.

4.1
4

JC8154: Chain of Custody
Page 3 of 3

Technical Report for

CH2M Hill

OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ

477213

SGS Accutest Job Number: JC9958

Sampling Date: 12/03/15

Report to:

CH2M Hill

Alexandra.SalterBlanc@ch2m.com

ATTN: Alexandra SalterBlanc

Total number of pages in report: 12



Test results contained within this data package meet the requirements
of the National Environmental Laboratory Accreditation Program
and/or state specific certification programs as applicable.

Nancy F. Cole

Nancy Cole
Laboratory Director

Client Service contact: Marty Vitanza 732-329-0200

Certifications: NJ(12129), NY(10983), CA, CT, DE, FL, IL, IN, KS, KY, LA, MA, MD, MI, MT, NC,
OH VAP (CL0056), AK (UST-103), AZ (AZ0786), PA, RI, SC, TN, TX, VA, WV, DoD ELAP (L-A-B L2248)

This report shall not be reproduced, except in its entirety, without the written approval of SGS Accutest.
Test results relate only to samples analyzed.

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Sample Summary

CH2M Hill

Job No: JC9958

OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ
Project No: 477213

Sample Number	Collected		Matrix Code	Type	Client Sample ID
	Date	Time By			
JC9958-1	12/03/15	10:00 JN	12/04/15	AQ Water	LEACHATE A-0 DAY
JC9958-2	12/03/15	10:30 JN	12/04/15	AQ Water	LEACHATE B-0 DAY

Summary of Hits

Page 1 of 1

Job Number: JC9958
Account: CH2M Hill
Project: OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ
Collected: 12/03/15

Lab Sample ID Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
--------------------------	------------------	-----------------	----	-----	-------	--------

JC9958-1 LEACHATE A-0 DAY

Acetone	2200	200	66	ug/l	SW846 8260C
Benzene	367000	2500	1200	ug/l	SW846 8260C
1,2-Dichlorobenzene	2120	20	3.7	ug/l	SW846 8260C
Naphthalene	1940	100	4.0	ug/l	SW846 8260C
Toluene	43100	1000	160	ug/l	SW846 8260C
Xylene (total)	2420	20	3.3	ug/l	SW846 8260C
Acetophenone	4480	100	14	ug/l	SW846 8270D

JC9958-2 LEACHATE B-0 DAY

Benzene	54500	500	240	ug/l	SW846 8260C
1,2-Dichlorobenzene	819	250	46	ug/l	SW846 8260C
Naphthalene	1800	1300	51	ug/l	SW846 8260C
Toluene	11600	250	41	ug/l	SW846 8260C
Xylene (total)	1390	250	41	ug/l	SW846 8260C
Acetophenone	4950	100	14	ug/l	SW846 8270D



Sample Results

Report of Analysis

Report of Analysis

Page 1 of 1

Client Sample ID:	LEACHATE A-0 DAY	Date Sampled:	12/03/15
Lab Sample ID:	JC9958-1	Date Received:	12/04/15
Matrix:	AQ - Water	Percent Solids:	n/a
Method:	SW846 8260C		
Project:	OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2A163848.D	20	12/07/15	TK	n/a	n/a	V2A6973
Run #2	2A163867.D	1000	12/08/15	TK	n/a	n/a	V2A6974
Run #3	2A163869.D	5000	12/08/15	TK	n/a	n/a	V2A6974

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml
Run #3	5.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	2200	200	66	ug/l	
71-43-2	Benzene	367000 ^a	2500	1200	ug/l	
95-50-1	1,2-Dichlorobenzene	2120	20	3.7	ug/l	
91-20-3	Naphthalene	1940	100	4.0	ug/l	
108-88-3	Toluene	43100 ^b	1000	160	ug/l	
1330-20-7	Xylene (total)	2420	20	3.3	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Run# 3	Limits
1868-53-7	Dibromofluoromethane	100%	99%	99%	76-120%
17060-07-0	1,2-Dichloroethane-D4	88%	97%	97%	73-122%
2037-26-5	Toluene-D8	97%	99%	100%	84-119%
460-00-4	4-Bromofluorobenzene	98%	99%	99%	78-117%

(a) Result is from Run# 3

(b) Result is from Run# 2

ND = Not detected MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

N = Indicates presumptive evidence of a compound

Report of Analysis

Page 1 of 1

Client Sample ID:	LEACHATE A-0 DAY		Date Sampled:	12/03/15
Lab Sample ID:	JC9958-1		Date Received:	12/04/15
Matrix:	AQ - Water		Percent Solids:	n/a
Method:	SW846 8270D SW846 3510C			
Project:	OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ			

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	P100913.D	1	12/08/15	LK	12/07/15	OP89514	EP4414
Run #2	P100917.D	50	12/08/15	LK	12/07/15	OP89514	EP4414

	Initial Volume	Final Volume
Run #1	1000 ml	1.0 ml
Run #2	1000 ml	1.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
98-86-2	Acetophenone	4480 ^a	100	14	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
4165-60-0	Nitrobenzene-d5	82%	0% ^b	32-128%
321-60-8	2-Fluorobiphenyl	85%	0% ^b	35-119%
1718-51-0	Terphenyl-d14	55%	0% ^b	10-126%

(a) Result is from Run# 2

(b) Outside control limits due to dilution.

ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

Report of Analysis

Page 1 of 1

Client Sample ID:	LEACHATE B-0 DAY	Date Sampled:	12/03/15
Lab Sample ID:	JC9958-2	Date Received:	12/04/15
Matrix:	AQ - Water	Percent Solids:	n/a
Method:	SW846 8260C		
Project:	OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2A163866.D	250	12/08/15	TK	n/a	n/a	V2A6974
Run #2	2A163869A.D	1000	12/08/15	TK	n/a	n/a	V2A6974

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	2500	830	ug/l	
71-43-2	Benzene	54500 ^a	500	240	ug/l	
95-50-1	1,2-Dichlorobenzene	819	250	46	ug/l	
91-20-3	Naphthalene	1800	1300	51	ug/l	
108-88-3	Toluene	11600	250	41	ug/l	
1330-20-7	Xylene (total)	1390	250	41	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	98%	99%	76-120%
17060-07-0	1,2-Dichloroethane-D4	96%	98%	73-122%
2037-26-5	Toluene-D8	99%	99%	84-119%
460-00-4	4-Bromofluorobenzene	99%	99%	78-117%

(a) Result is from Run# 2

ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

Report of Analysis

Page 1 of 1

Client Sample ID:	LEACHATE B-0 DAY			Date Sampled:	12/03/15
Lab Sample ID:	JC9958-2			Date Received:	12/04/15
Matrix:	AQ - Water			Percent Solids:	n/a
Method:	SW846 8270D SW846 3510C				
Project:	OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ				

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	P100914.D	1	12/08/15	LK	12/07/15	OP89514	EP4414
Run #2	P100918.D	50	12/08/15	LK	12/07/15	OP89514	EP4414

	Initial Volume	Final Volume
Run #1	1000 ml	1.0 ml
Run #2	1000 ml	1.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
98-86-2	Acetophenone	4950 ^a	100	14	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
4165-60-0	Nitrobenzene-d5	84%	0% ^b	32-128%
321-60-8	2-Fluorobiphenyl	91%	0% ^b	35-119%
1718-51-0	Terphenyl-d14	90%	0% ^b	10-126%

(a) Result is from Run# 2

(b) Outside control limits due to dilution.

ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound



Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody



PAGE / OF /

FEDEX Tracking #	6514 9162 7951	Order Order Control #	MV-10/31/2015-1058
Account Order #		Accession Doc #	TC958

Client / Reporting Information				Project Information				Requested Analysis (see TEST CODE sheet)				Matrix Codes			
Company Name CH2M Hill				Project Name 04B American Cyanamid Superfund Site											
Street Address 				Street 				Billing Information (If different from Report to) 							
City 		State 		Zip 		City 		State 		Zip 					
Project Contact Jeff Morrison				Project # 				Street Address 							
Phone 389-927-2402		Fax # 		Client Purchase Order # 		City 		State 		Zip 					
Secondary Contact: Garrett Nelson 512-263-2101				Project Manager Jeff Morrison				Address 							
				Collector 				Number of Preserved Bottles 							
Accuser Sample 				Field ID / Point of Collection 				Method of Use 				Date 			
				Time 				Sample ID 				Matrix 			
				Date 				Time 				Sample ID 			
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				Time 				Sample ID 				Matrix 			
				Date 				Time 				Sample ID 			

Page 1 of 2



Accutest Laboratories Sample Receipt Summary

Accutest Job Number: JC9958 Client: _____ Project: _____
Date / Time Received: 12/4/2015 9:15:00 AM Delivery Method: _____ Airbill #'s: _____

Cooler Temps (Raw Measured) °C: Cooler 1: (4.0);

Cooler Temps (Corrected) °C: Cooler 1: (4.4);

Cooler Security

Y or N

- | | | | | | |
|---------------------------|-------------------------------------|--------------------------|-----------------------|-------------------------------------|--------------------------|
| 1. Custody Seals Present: | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 3. COC Present: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. Custody Seals Intact: | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 4. Smpl Dates/Time OK | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Cooler Temperature

Y or N

- | | | |
|------------------------------|-------------------------------------|--------------------------|
| 1. Temp criteria achieved: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. Cooler temp verification: | IR Gun | |
| 3. Cooler media: | Ice (Bag) | |
| 4. No. Coolers: | 1 | |

Quality Control Preservation

Y or N

N/A

- | | | | |
|---------------------------------|-------------------------------------|-------------------------------------|--------------------------|
| 1. Trip Blank present / cooler: | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. Trip Blank listed on COC: | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 3. Samples preserved properly: | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| 4. VOCs headspace free: | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Sample Integrity - Documentation

Y or N

- | | | |
|--|-------------------------------------|--------------------------|
| 1. Sample labels present on bottles: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. Container labeling complete: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 3. Sample container label / COC agree: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Sample Integrity - Condition

Y or N

- | | | |
|----------------------------------|-------------------------------------|--------------------------|
| 1. Sample recvd within HT: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. All containers accounted for: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 3. Condition of sample: | Intact | |

Sample Integrity - Instructions

Y or N N/A

- | | | | |
|---|-------------------------------------|-------------------------------------|-------------------------------------|
| 1. Analysis requested is clear: | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| 2. Bottles received for unspecified tests | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| 3. Sufficient volume recvd for analysis: | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| 4. Compositing instructions clear: | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 5. Filtering instructions clear: | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Comments

Accutest Laboratories
V: 732.329.0200

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F: 732.329.3499

Dayton, New Jersey
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JC9958: Chain of Custody

Page 2 of 2

Technical Report for

CH2M Hill

OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ

477213

SGS Accutest Job Number: JC12057

Sampling Date: 01/05/16

Report to:

CH2M Hill

Alexandra.SalterBlanc@ch2m.com

ATTN: Alexandra SalterBlanc

Total number of pages in report: **14**



Test results contained within this data package meet the requirements
of the National Environmental Laboratory Accreditation Program
and/or state specific certification programs as applicable.



Nancy Cole
Laboratory Director

Client Service contact: Marty Vitanza 732-329-0200

Certifications: NJ(12129), NY(10983), CA, CT, DE, FL, IL, IN, KS, KY, LA, MA, MD, MI, MT, NC,
OH VAP (CL0056), AK (UST-103), AZ (AZ0786), PA, RI, SC, TN, TX, VA, WV, DoD ELAP (L-A-B L2248)

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Test results relate only to samples analyzed.

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Sample Summary

CH2M Hill

Job No: JC12057

OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ
Project No: 477213

Sample Number	Collected Date	Time By	Received	Matrix Code	Type	Client Sample ID
JC12057-1	01/05/16	14:00 JAN	01/06/16	AQ	Water	LEACHATE A -30 DAY
JC12057-1R	01/05/16	14:00 JAN	01/06/16	AQ	Water	LEACHATE A -30 DAY
JC12057-2	01/05/16	14:15 JAN	01/06/16	AQ	Water	LEACHATE B -30 DAY
JC12057-2R	01/05/16	14:15 JAN	01/06/16	AQ	Water	LEACHATE B -30 DAY

Summary of Hits

Page 1 of 1

Job Number: JC12057

Account: CH2M Hill

Project: OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ

Collected: 01/05/16

Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
JC12057-1	LEACHATE A -30 DAY					
Benzene		130000	500	240	ug/l	SW846 8260C
Toluene		4990	1000	160	ug/l	SW846 8260C
JC12057-1R	LEACHATE A -30 DAY					
Acetophenone		3560	100	14	ug/l	SW846 8270D
JC12057-2	LEACHATE B -30 DAY					
Benzene		27700	100	47	ug/l	SW846 8260C
Toluene		1780	200	32	ug/l	SW846 8260C
Xylene (total)		70.2 J	200	33	ug/l	SW846 8260C
JC12057-2R	LEACHATE B -30 DAY					
Acetophenone		7150	400	55	ug/l	SW846 8270D

Sample Results

Report of Analysis

Report of Analysis

Page 1 of 1

Client Sample ID:	LEACHATE A -30 DAY		Date Sampled:	01/05/16
Lab Sample ID:	JC12057-1		Date Received:	01/06/16
Matrix:	AQ - Water		Percent Solids:	n/a
Method:	SW846 8260C			
Project:	OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ			

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2B138095.D	1000	01/07/16	EH	n/a	n/a	V2B6151
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10000	3300	ug/l	
71-43-2	Benzene	130000	500	240	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	1000	190	ug/l	
91-20-3	Naphthalene	ND	5000	200	ug/l	
108-88-3	Toluene	4990	1000	160	ug/l	
1330-20-7	Xylene (total)	ND	1000	170	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	100%		76-120%
17060-07-0	1,2-Dichloroethane-D4	98%		73-122%
2037-26-5	Toluene-D8	101%		84-119%
460-00-4	4-Bromofluorobenzene	97%		78-117%

ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

Report of Analysis

Page 1 of 1

Client Sample ID:	LEACHATE A -30 DAY	Date Sampled:	01/05/16
Lab Sample ID:	JC12057-1R	Date Received:	01/06/16
Matrix:	AQ - Water	Percent Solids:	n/a
Method:	SW846 8270D SW846 3510C		
Project:	OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	P101844.D	1	01/11/16	SD	01/11/16	OP90386	EP4460
Run #2	P101869.D	50	01/12/16	LK	01/11/16	OP90386	EP4461

	Initial Volume	Final Volume
Run #1	1000 ml	1.0 ml
Run #2	1000 ml	1.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
98-86-2	Acetophenone	3560 ^a	100	14	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	49%	54%	14-88%
4165-62-2	Phenol-d5	35%	54%	10-110%
118-79-6	2,4,6-Tribromophenol	126%	74%	39-149%
4165-60-0	Nitrobenzene-d5	77%	83%	32-128%
321-60-8	2-Fluorobiphenyl	82%	93%	35-119%
1718-51-0	Terphenyl-d14	59%	57%	10-126%

(a) Result is from Run# 2

ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

Report of Analysis

Page 1 of 1

Client Sample ID:	LEACHATE B -30 DAY	Date Sampled:	01/05/16
Lab Sample ID:	JC12057-2	Date Received:	01/06/16
Matrix:	AQ - Water	Percent Solids:	n/a
Method:	SW846 8260C		
Project:	OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2B138096.D	200	01/07/16	EH	n/a	n/a	V2B6151
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	2000	660	ug/l	
71-43-2	Benzene	27700	100	47	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	200	37	ug/l	
91-20-3	Naphthalene	ND	1000	40	ug/l	
108-88-3	Toluene	1780	200	32	ug/l	
1330-20-7	Xylene (total)	70.2	200	33	ug/l	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	101%		76-120%
17060-07-0	1,2-Dichloroethane-D4	98%		73-122%
2037-26-5	Toluene-D8	101%		84-119%
460-00-4	4-Bromofluorobenzene	98%		78-117%

ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

Report of Analysis

Page 1 of 1

Client Sample ID:	LEACHATE B -30 DAY	Date Sampled:	01/05/16
Lab Sample ID:	JC12057-2R	Date Received:	01/06/16
Matrix:	AQ - Water	Percent Solids:	n/a
Method:	SW846 8270D SW846 3510C		
Project:	OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	P101843.D	1	01/11/16	SD	01/11/16	OP90386	EP4460
Run #2	P101881.D	200	01/12/16	LK	01/11/16	OP90386	EP4461

	Initial Volume	Final Volume
Run #1	1000 ml	1.0 ml
Run #2	1000 ml	1.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
98-86-2	Acetophenone	7150 ^a	400	55	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	43%	0% ^b	14-88%
4165-62-2	Phenol-d5	28%	0% ^b	10-110%
118-79-6	2,4,6-Tribromophenol	119%	0% ^b	39-149%
4165-60-0	Nitrobenzene-d5	81%	0% ^b	32-128%
321-60-8	2-Fluorobiphenyl	87%	0% ^b	35-119%
1718-51-0	Terphenyl-d14	75%	0% ^b	10-126%

(a) Result is from Run# 2

(b) Outside control limits due to dilution.

ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound



Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody



Accutest Laboratories Sample Receipt Summary

Accutest Job Number: JC12057

Client: CH2MHILL

Project: OU8 American Cyanamid Superfund Site

Date / Time Received: 1/6/2016 9:40:00 AM

Delivery Method: FedEx

Airbill #s: 651491627966

Cooler Temps (Raw Measured) °C: Cooler 1: (1.8);

Cooler Temps (Corrected) °C: Cooler 1: (2.2);

Cooler Security

Y or N

Y or N

- | | | | | | |
|---------------------------|-------------------------------------|--------------------------|-----------------------|-------------------------------------|--------------------------|
| 1. Custody Seals Present: | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 3. COC Present: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. Custody Seals Intact: | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 4. Smpl Dates/Time OK | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Cooler Temperature

Y or N

- | | | |
|------------------------------|-------------------------------------|--------------------------|
| 1. Temp criteria achieved: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. Cooler temp verification: | IR Gun | |
| 3. Cooler media: | Ice (Bag) | |
| 4. No. Coolers | 1 | |

Quality Control Preservation

Y

N

N/A

- | | | | |
|---------------------------------|-------------------------------------|-------------------------------------|--------------------------|
| 1. Trip Blank present / cooler: | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. Trip Blank listed on COC: | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 3. Samples preserved properly: | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| 4. VOCs headspace free: | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Sample Integrity - Documentation

Y or N

- | | | |
|--|-------------------------------------|--------------------------|
| 1. Sample labels present on bottles: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. Container labeling complete: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 3. Sample container label / COC agree: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Sample Integrity - Condition

Y or N

- | | | |
|----------------------------------|-------------------------------------|--------------------------|
| 1. Sample recvd within HT: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. All containers accounted for: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 3. Condition of sample: | Intact | |

Sample Integrity - Instructions

Y

N

N/A

- | | | | |
|---|-------------------------------------|-------------------------------------|-------------------------------------|
| 1. Analysis requested is clear: | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| 2. Bottles received for unspecified tests | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| 3. Sufficient volume recvd for analysis: | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| 4. Compositing instructions clear: | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 5. Filtering instructions clear: | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Comments -1 & -2 No analysis noted on COC. Rec'd 2x 950ml unpreserved amber bottles and 3 HCL Preserved VOC's.

-2 2 of 3 VOC vials rec'd with macrobubbles.

Accutest Laboratories
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JC12057: Chain of Custody

Page 2 of 4



Sample Receipt Summary - Problem Resolution

Accutest Job Number: JC12057

Initiator: ANDREWS

CSR: MV

Response Date: 1/6/2016

Response: V8260ACE
VMS+12DCB
VMS+BENZ
VMS+NAP
VMS+TOLUEN
VMS+XYL

Also needs to be 48 hour t/a, which was not marked on the chain. COMMB Data deliverables.
Per Jeff Morrison



Job Change Order: JC12057

Requested Date: 1/8/2016
Account Name: CH2M Hill
Project Description: OU8 American Cyanamid Superfund Site, 20 Polhe
CSR: martyv
Received Date: 1/6/2016
Due Date: 1/8/2016
Deliverable: COMMB
TAT (Days): 2

Sample #: JC12057-1, 2
Dept: Relog for B8270ACEPHEN

TAT: 2

JC12057: Chain of Custody

Page 4 of 4

Above Changes Per: Jeff Morrison Date/Time: 1/8/2016 5:20:01 PM

To Client: This Change Order is confirmation of the revisions, previously discussed with the Accutest Client Service Representative.

Technical Report for

CH2M Hill

OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ

477213

SGS Accutest Job Number: JC12676

Sampling Date: 01/14/16

Report to:

CH2M Hill

Alexandra.SalterBlanc@ch2m.com

ATTN: Alexandra SalterBlanc

Total number of pages in report: 11



Test results contained within this data package meet the requirements
of the National Environmental Laboratory Accreditation Program
and/or state specific certification programs as applicable.



Nancy Cole
Laboratory Director

Client Service contact: Marty Vitanza 732-329-0200

Certifications: NJ(12129), NY(10983), CA, CT, DE, FL, IL, IN, KS, KY, LA, MA, MD, MI, MT, NC,
OH VAP (CL0056), AK (UST-103), AZ (AZ0786), PA, RI, SC, TN, TX, VA, WV, DoD ELAP (L-A-B L2248)

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Sample Summary

CH2M Hill

Job No: JC12676

OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ
Project No: 477213

Sample Number	Collected		Matrix Code Type	Client Sample ID
	Date	Time By	Received	
JC12676-1	01/14/16	14:30 JAN	01/15/16 AQ Water	LEACHATE A - 43 DAY
JC12676-2	01/14/16	15:00 JAN	01/15/16 AQ Water	LEACHATE B - 43 DAY

Summary of Hits

Page 1 of 1

Job Number: JC12676

Account: CH2M Hill

Project: OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ

Collected: 01/14/16

Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
---------------	------------------	-----------------	----	-----	-------	--------

JC12676-1 LEACHATE A - 43 DAY

Acetone	3480 J	5000	1700	ug/l	SW846 8260C
Benzene	243000	1000	470	ug/l	SW846 8260C
1,2-Dichlorobenzene	483 J	500	93	ug/l	SW846 8260C
Naphthalene	382 J	2500	100	ug/l	SW846 8260C
Toluene	14700	500	81	ug/l	SW846 8260C
Xylene (total)	456 J	500	83	ug/l	SW846 8260C

JC12676-2 LEACHATE B - 43 DAY

Acetone	1090	250	83	ug/l	SW846 8260C
Benzene	48200	130	59	ug/l	SW846 8260C
1,2-Dichlorobenzene	788	25	4.6	ug/l	SW846 8260C
Naphthalene	2300	130	5.1	ug/l	SW846 8260C
Toluene	6360	250	41	ug/l	SW846 8260C
Xylene (total)	1050	25	4.1	ug/l	SW846 8260C

Sample Results

Report of Analysis

Report of Analysis

Page 1 of 1

Client Sample ID:	LEACHATE A - 43 DAY	Date Sampled:	01/14/16
Lab Sample ID:	JC12676-1	Date Received:	01/15/16
Matrix:	AQ - Water	Percent Solids:	n/a
Method:	SW846 8260C		
Project:	OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4B58800.D	500	01/16/16	TP	n/a	n/a	V4B2468
Run #2	4B58801.D	2000	01/16/16	TP	n/a	n/a	V4B2468

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	3480	5000	1700	ug/l	J
71-43-2	Benzene	243000 ^a	1000	470	ug/l	
95-50-1	1,2-Dichlorobenzene	483	500	93	ug/l	J
91-20-3	Naphthalene	382	2500	100	ug/l	J
108-88-3	Toluene	14700	500	81	ug/l	
1330-20-7	Xylene (total)	456	500	83	ug/l	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	107%	107%	76-120%
17060-07-0	1,2-Dichloroethane-D4	107%	108%	73-122%
2037-26-5	Toluene-D8	107%	108%	84-119%
460-00-4	4-Bromofluorobenzene	111%	114%	78-117%

(a) Result is from Run# 2

ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

Report of Analysis

Page 1 of 1

Client Sample ID:	LEACHATE B - 43 DAY	Date Sampled:	01/14/16
Lab Sample ID:	JC12676-2	Date Received:	01/15/16
Matrix:	AQ - Water	Percent Solids:	n/a
Method:	SW846 8260C		
Project:	OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4B58802.D	25	01/16/16	TP	n/a	n/a	V4B2468
Run #2	4B58803.D	250	01/16/16	TP	n/a	n/a	V4B2468

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	1090	250	83	ug/l	
71-43-2	Benzene	48200 ^a	130	59	ug/l	
95-50-1	1,2-Dichlorobenzene	788	25	4.6	ug/l	
91-20-3	Naphthalene	2300	130	5.1	ug/l	
108-88-3	Toluene	6360 ^a	250	41	ug/l	
1330-20-7	Xylene (total)	1050	25	4.1	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	107%	105%	76-120%
17060-07-0	1,2-Dichloroethane-D4	110%	107%	73-122%
2037-26-5	Toluene-D8	107%	108%	84-119%
460-00-4	4-Bromofluorobenzene	111%	111%	78-117%

(a) Result is from Run# 2

ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

2015 Route 124, Dayton, NJ 05415
TEL: 781-526-0250 FAX: 781-526-0481
WWW.ACCUTEST.COM

FED-EX Tracking #	5054 7489 5548	Barcode Control #	MY-10012015-1058
Accepted Date		Received Date	JC 12-16

Client / Reporting Information		Project Information		Requested Analysis (see TEST CODE sheet)		Matrix Codes	
Company Name CH2M-Hill		Project Name QUE American Oyster and Superfund Site					
Street Address		Street					
City State Zip		City State Zip					
Project Contact Jeff Morrison		Project #					
Phone # 339-527-2402		Client Purchase Order #					
Sample Location Jarrett Nelson		Project Manager Jeff Morrison					

Sample #	Field ID - Point of Collection	VELOCITY	Collection		Sample #	Matrix	# of Bubbles	Number of Selected Bubbles										VOLUME (mL) (100)	LAB USE ONLY
			Date	Time				IC	HC	HC2	HC3	HC4	HC5	HC6	HC7	HC8	HC9		
1	Leachate A - 43 day		1/14/16	14:30	JAN	LIQ		3										1	✓ 100
2	Leachate B - 43 day		1/14/16	15:00	JAN	LIQ		3										1	

<input type="checkbox"/> Std. 10 Business Days <input type="checkbox"/> 5 Day RUSH <input type="checkbox"/> 3 Day RUSH <input checked="" type="checkbox"/> 1 Day RUSH <input type="checkbox"/> 1 Day RUSH <input type="checkbox"/> Other		Approved By (Accutest PM): _____ _____ _____	Data Deliverable Information <input type="checkbox"/> Commercial "A" (Level 1) <input type="checkbox"/> Commercial "B" (Level 2) <input type="checkbox"/> FULLT1 (Level 3+4) <input type="checkbox"/> NJ Reduced <input type="checkbox"/> Commercial "C" <input type="checkbox"/> NJ Data of Known Quality Protocol Reporting Comments: "A" = Results Only, Commercial "B" = Results + GC Summary NJ Reduced = Results + GC Summary + Parent Raw data	<input type="checkbox"/> NYASP Category A <input type="checkbox"/> NYASP Category B <input type="checkbox"/> State Forms <input type="checkbox"/> EDO Format <input type="checkbox"/> Other	Comments / Special Instructions Test for Acetone, Benzene, 1,2-DCB, Naphthalene, Toluene and Xylene. Contact: Jeff Morrison or Marty Vitarzo with questions.
Emergency & Backup Data available for later		Sample inventory is verified upon receipt in the Laboratory			

Requisitioned By: Jeff Morrison Date Time: 1/14/16 Requisitioned By: Jeff Morrison Date Time: 1/14/16 Requisitioned By: Jeff Morrison Date Time: 1/14/16	Received By: FedEx Date Time: 1/14/16 Received By: FedEx Date Time: 1/14/16 Received By: FedEx Date Time: 1/14/16	Received By: FedEx Date Time: 1/14/16 Received By: FedEx Date Time: 1/14/16 Received By: FedEx Date Time: 1/14/16	Received By: FedEx Date Time: 1/14/16 Received By: FedEx Date Time: 1/14/16 Received By: FedEx Date Time: 1/14/16
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JC12676: Chain of Custody

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Accutest Laboratories Sample Receipt Summary

Accutest Job Number: JC12676

Client: CH2M HILL

Project: OUB AMERICAN CYANAMID SUPERFUND SITE.

Date / Time Received: 1/15/2016 9:15:00 AM

Delivery Method: 8094 7489 6548

Airbill #s:

Cooler Temps (Raw Measured) °C: Cooler 1: (3.1);

Cooler Temps (Corrected) °C: Cooler 1: (3.5);

Cooler Security

Y or N

Y or N

- | | | | | | |
|---------------------------|-------------------------------------|--------------------------|-----------------------|-------------------------------------|--------------------------|
| 1. Custody Seals Present: | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 3. COC Present: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. Custody Seals Intact: | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 4. Smpl Dates/Time OK | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Cooler Temperature

Y or N

- | | | |
|------------------------------|-------------------------------------|--------------------------|
| 1. Temp criteria achieved: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. Cooler temp verification: | IR Gun | |
| 3. Cooler media: | Ice (Bag) | |
| 4. No. Coolers | 1 | |

Quality Control Preservation

Y

N

N/A

- | | | | |
|---------------------------------|-------------------------------------|-------------------------------------|--------------------------|
| 1. Trip Blank present / cooler: | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. Trip Blank listed on COC: | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 3. Samples preserved properly: | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| 4. VOCs headspace free: | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Sample Integrity - Documentation

Y or N

- | | | |
|--|-------------------------------------|--------------------------|
| 1. Sample labels present on bottles: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. Container labeling complete: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 3. Sample container label / COC agree: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Sample Integrity - Condition

Y or N

- | | | |
|----------------------------------|-------------------------------------|--------------------------|
| 1. Sample recvd within HT: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. All containers accounted for: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 3. Condition of sample: | Intact | |

Sample Integrity - Instructions

Y

N

N/A

- | | | | |
|---|-------------------------------------|-------------------------------------|-------------------------------------|
| 1. Analysis requested is clear: | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| 2. Bottles received for unspecified tests | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| 3. Sufficient volume recvd for analysis: | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| 4. Compositing instructions clear: | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 5. Filtering instructions clear: | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Comments 1) -2 LEACHATE B-43 DAY1 OF 3 VOA'S , MACROBUBBLE.

2) -1 & -2 VIALS ARE HCL PRESERVED, IS THIS OK?

Accutest Laboratories
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2235 US Highway 130
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Dayton, New Jersey
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JC12676: Chain of Custody

Page 2 of 3



Sample Receipt Summary - Problem Resolution

Accutest Job Number: JC12676

Initiator: BOBL

CSR: Michelle

Response Date: 1/15/2016

Response: Per email sent out from Marty V, total VOA's are only being run on these samples

4.1

4

Technical Report for

CH2M Hill

OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ

477213

SGS Accutest Job Number: JC13584

Sampling Date: 02/02/16

Report to:

CH2M Hill

Alexandra.SalterBlanc@ch2m.com

ATTN: Alexandra SalterBlanc

Total number of pages in report: **15**



Test results contained within this data package meet the requirements
of the National Environmental Laboratory Accreditation Program
and/or state specific certification programs as applicable.

Nancy F. Cole

Nancy Cole
Laboratory Director

Client Service contact: Marty Vitanza 732-329-0200

Certifications: NJ(12129), NY(10983), CA, CT, DE, FL, IL, IN, KS, KY, LA, MA, MD, MI, MT, NC,
OH VAP (CL0056), AK (UST-103), AZ (AZ0786), PA, RI, SC, TN, TX, VA, WV, DoD ELAP (L-A-B L2248)

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Test results relate only to samples analyzed.

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Sample Summary

CH2M Hill

Job No: JC13584

OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ
Project No: 477213

Sample Number	Collected Date	Time By	Received	Matrix Code	Type	Client Sample ID
JC13584-1	02/02/16	14:30 JAN	02/03/16	AQ	Water	LEACHATE A - 60 DAY
JC13584-2	02/02/16	14:45 JAN	02/03/16	AQ	Water	LEACHATE B - 60 DAY
JC13584-3	02/02/16	15:00 JAN	02/03/16	AQ	Water	ABSORPTION - 0 DAY
JC13584-4	02/02/16	15:15 JAN	02/03/16	AQ	Water	ABSORPTION CONTROL - 0 DAY

Summary of Hits

Page 1 of 1

Job Number: JC13584**Account:** CH2M Hill**Project:** OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ**Collected:** 02/02/16

Lab Sample ID Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
--------------------------	------------------	-----------------	----	-----	-------	--------

JC13584-1 LEACHATE A - 60 DAY

Acetone	4220	2500	830	ug/l	SW846 8260C
Benzene	166000	1300	590	ug/l	SW846 8260C
1,2-Dichlorobenzene	148 J	250	46	ug/l	SW846 8260C
Naphthalene	54.0 J	1300	51	ug/l	SW846 8260C
Toluene	8690	250	41	ug/l	SW846 8260C
Xylene (total)	147 J	250	41	ug/l	SW846 8260C
Acetophenone	4790	100	14	ug/l	SW846 8270D

JC13584-2 LEACHATE B - 60 DAY

Acetone	841 J	1000	330	ug/l	SW846 8260C
Benzene	25100	500	240	ug/l	SW846 8260C
1,2-Dichlorobenzene	55.3 J	100	19	ug/l	SW846 8260C
Naphthalene	60.2 J	500	20	ug/l	SW846 8260C
Toluene	2150	100	16	ug/l	SW846 8260C
Xylene (total)	134	100	17	ug/l	SW846 8260C
Acetophenone	6910	200	28	ug/l	SW846 8270D

JC13584-3 ABSORPTION - 0 DAY

Acetone	2740 J	5000	1700	ug/l	SW846 8260C
Benzene	213000	2500	1200	ug/l	SW846 8260C
1,2-Dichlorobenzene	196 J	500	93	ug/l	SW846 8260C
Naphthalene	109 J	2500	100	ug/l	SW846 8260C
Toluene	12200	500	81	ug/l	SW846 8260C
Xylene (total)	215 J	500	83	ug/l	SW846 8260C

JC13584-4 ABSORPTION CONTROL - 0 DAY

Acetone	2940	2000	660	ug/l	SW846 8260C
Benzene	181000	500	240	ug/l	SW846 8260C
1,2-Dichlorobenzene	179 J	200	37	ug/l	SW846 8260C
Naphthalene	78.4 J	1000	40	ug/l	SW846 8260C
Toluene	11200	200	32	ug/l	SW846 8260C
Xylene (total)	328	200	33	ug/l	SW846 8260C



Sample Results

Report of Analysis

Report of Analysis

Page 1 of 1

Client Sample ID:	LEACHATE A - 60 DAY	Date Sampled:	02/02/16
Lab Sample ID:	JC13584-1	Date Received:	02/03/16
Matrix:	AQ - Water	Percent Solids:	n/a
Method:	SW846 8260C		
Project:	OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L279007.D	250	02/05/16	EH	n/a	n/a	VL7670
Run #2	L279008.D	2500	02/05/16	EH	n/a	n/a	VL7670

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	4220	2500	830	ug/l	
71-43-2	Benzene	166000 ^a	1300	590	ug/l	
95-50-1	1,2-Dichlorobenzene	148	250	46	ug/l	J
91-20-3	Naphthalene	54.0	1300	51	ug/l	J
108-88-3	Toluene	8690	250	41	ug/l	
1330-20-7	Xylene (total)	147	250	41	ug/l	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	106%	105%	76-120%
17060-07-0	1,2-Dichloroethane-D4	111%	110%	73-122%
2037-26-5	Toluene-D8	106%	103%	84-119%
460-00-4	4-Bromofluorobenzene	103%	106%	78-117%

(a) Result is from Run# 2

ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

Report of Analysis

Page 1 of 1

Client Sample ID:	LEACHATE A - 60 DAY	Date Sampled:	02/02/16
Lab Sample ID:	JC13584-1	Date Received:	02/03/16
Matrix:	AQ - Water	Percent Solids:	n/a
Method:	SW846 8270D SW846 3510C		
Project:	OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	P102381.D	1	02/04/16	SD	02/03/16	OP90955	EP4491
Run #2	P102388.D	50	02/04/16	LK	02/03/16	OP90955	EP4492

	Initial Volume	Final Volume
Run #1	1000 ml	1.0 ml
Run #2	1000 ml	1.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
98-86-2	Acetophenone	4790 ^a	100	14	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	57%	63%	14-88%
4165-62-2	Phenol-d5	43%	44%	10-110%
118-79-6	2,4,6-Tribromophenol	130%	70%	39-149%
4165-60-0	Nitrobenzene-d5	96%	107%	32-128%
321-60-8	2-Fluorobiphenyl	84%	94%	35-119%
1718-51-0	Terphenyl-d14	79%	71%	10-126%

(a) Result is from Run# 2

ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

Report of Analysis

Page 1 of 1

Client Sample ID:	LEACHATE B - 60 DAY	Date Sampled:	02/02/16
Lab Sample ID:	JC13584-2	Date Received:	02/03/16
Matrix:	AQ - Water	Percent Solids:	n/a
Method:	SW846 8260C		
Project:	OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L279011.D	100	02/05/16	EH	n/a	n/a	VL7670
Run #2	L278996.D	1000	02/05/16	EH	n/a	n/a	VL7669

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	841	1000	330	ug/l	J
71-43-2	Benzene	25100 ^a	500	240	ug/l	
95-50-1	1,2-Dichlorobenzene	55.3	100	19	ug/l	J
91-20-3	Naphthalene	60.2	500	20	ug/l	J
108-88-3	Toluene	2150	100	16	ug/l	
1330-20-7	Xylene (total)	134	100	17	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	106%	105%	76-120%
17060-07-0	1,2-Dichloroethane-D4	109%	109%	73-122%
2037-26-5	Toluene-D8	103%	101%	84-119%
460-00-4	4-Bromofluorobenzene	103%	104%	78-117%

(a) Result is from Run# 2

ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

Report of Analysis

Page 1 of 1

Client Sample ID:	LEACHATE B - 60 DAY	Date Sampled:	02/02/16
Lab Sample ID:	JC13584-2	Date Received:	02/03/16
Matrix:	AQ - Water	Percent Solids:	n/a
Method:	SW846 8270D SW846 3510C		
Project:	OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	P102380.D	1	02/03/16	SD	02/03/16	OP90955	EP4491
Run #2	P102387.D	100	02/04/16	LK	02/03/16	OP90955	EP4492

	Initial Volume	Final Volume
Run #1	1000 ml	1.0 ml
Run #2	1000 ml	1.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
98-86-2	Acetophenone	6910 ^a	200	28	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	49%	0% ^b	14-88%
4165-62-2	Phenol-d5	30%	0% ^b	10-110%
118-79-6	2,4,6-Tribromophenol	118%	0% ^b	39-149%
4165-60-0	Nitrobenzene-d5	89%	0% ^b	32-128%
321-60-8	2-Fluorobiphenyl	87%	0% ^b	35-119%
1718-51-0	Terphenyl-d14	76%	0% ^b	10-126%

(a) Result is from Run# 2

(b) Outside control limits due to dilution.

ND = Not detected MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

N = Indicates presumptive evidence of a compound

Report of Analysis

Page 1 of 1

Client Sample ID:	ABSORPTION - 0 DAY			Date Sampled:	02/02/16
Lab Sample ID:	JC13584-3			Date Received:	02/03/16
Matrix:	AQ - Water			Percent Solids:	n/a
Method:	SW846 8260C				
Project:	OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ				

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L279005.D	500	02/05/16	EH	n/a	n/a	VL7670
Run #2	L279006.D	5000	02/05/16	EH	n/a	n/a	VL7670

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	2740	5000	1700	ug/l	J
71-43-2	Benzene	213000 ^a	2500	1200	ug/l	
95-50-1	1,2-Dichlorobenzene	196	500	93	ug/l	J
91-20-3	Naphthalene	109	2500	100	ug/l	J
108-88-3	Toluene	12200	500	81	ug/l	
1330-20-7	Xylene (total)	215	500	83	ug/l	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	105%	103%	76-120%
17060-07-0	1,2-Dichloroethane-D4	109%	109%	73-122%
2037-26-5	Toluene-D8	106%	102%	84-119%
460-00-4	4-Bromofluorobenzene	105%	105%	78-117%

(a) Result is from Run# 2

ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

Report of Analysis

Page 1 of 1

Client Sample ID:	ABSORPTION CONTROL - 0 DAY		
Lab Sample ID:	JC13584-4	Date Sampled:	02/02/16
Matrix:	AQ - Water	Date Received:	02/03/16
Method:	SW846 8260C	Percent Solids:	n/a
Project:	OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	L279013.D	200	02/05/16	EH	n/a	n/a	VL7670
Run #2	L278991.D	1000	02/05/16	EH	n/a	n/a	VL7669

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	2940	2000	660	ug/l	
71-43-2	Benzene	181000 ^a	500	240	ug/l	
95-50-1	1,2-Dichlorobenzene	179	200	37	ug/l	J
91-20-3	Naphthalene	78.4	1000	40	ug/l	J
108-88-3	Toluene	11200	200	32	ug/l	
1330-20-7	Xylene (total)	328	200	33	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	105%	106%	76-120%
17060-07-0	1,2-Dichloroethane-D4	113%	110%	73-122%
2037-26-5	Toluene-D8	105%	104%	84-119%
460-00-4	4-Bromofluorobenzene	102%	103%	78-117%

(a) Result is from Run# 2

ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound



Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

[illegible]

JC13584: Chain of Custody

Page 1 of 3



Accutest Laboratories Sample Receipt Summary

Accutest Job Number: JC13584

Client: CH2MHILL

Project: OU8 American Cyanamid

Date / Time Received: 2/3/2016 9:45:00 AM

Delivery Method: FedEx

Airbill #s: 809474896592

Cooler Temps (Raw Measured) °C: Cooler 1: (5.2);

Cooler Temps (Corrected) °C: Cooler 1: (5.2);

Cooler Security

Y or N

Y or N

- | | | | | | |
|---------------------------|-------------------------------------|--------------------------|-----------------------|-------------------------------------|--------------------------|
| 1. Custody Seals Present: | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 3. COC Present: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. Custody Seals Intact: | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 4. Smpl Dates/Time OK | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Cooler Temperature

Y or N

- | | | |
|------------------------------|-------------------------------------|--------------------------|
| 1. Temp criteria achieved: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. Cooler temp verification: | IR Gun | |
| 3. Cooler media: | Ice (Bag) | |
| 4. No. Coolers | 1 | |

Quality Control Preservation

Y

N

N/A

- | | | | |
|---------------------------------|-------------------------------------|-------------------------------------|--------------------------|
| 1. Trip Blank present / cooler: | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. Trip Blank listed on COC: | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 3. Samples preserved properly: | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| 4. VOCs headspace free: | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Sample Integrity - Documentation

Y or N

- | | | |
|--|-------------------------------------|--------------------------|
| 1. Sample labels present on bottles: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. Container labeling complete: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 3. Sample container label / COC agree: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Sample Integrity - Condition

Y or N

- | | | |
|----------------------------------|-------------------------------------|--------------------------|
| 1. Sample recvd within HT: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. All containers accounted for: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 3. Condition of sample: | Intact | |

Sample Integrity - Instructions

Y

N

N/A

- | | | | |
|---|-------------------------------------|-------------------------------------|-------------------------------------|
| 1. Analysis requested is clear: | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| 2. Bottles received for unspecified tests | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| 3. Sufficient volume recvd for analysis: | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| 4. Compositing instructions clear: | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 5. Filtering instructions clear: | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Comments

- 1) -1: 2 of 3 vials rec'd with macrobubbles, no screen provided.
- 2) -3: 3 of 4 vials rec'd with macrobubbles, no screen provided.

Accutest Laboratories
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2235 US Highway 130
F: 732.329.3499

Dayton, New Jersey
www.accutest.com

JC13584: Chain of Custody

Page 2 of 3



Sample Receipt Summary - Problem Resolution

Accutest Job Number: JC13584

Initiator: daveh

CSR: MV

Response Date: 2/3/2016

Response: Client notified- Proceed as noted.

4.1
4

Technical Report for

CH2M Hill

OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ

477213

SGS Accutest Job Number: JC14076

Sampling Date: 02/10/16

Report to:

CH2M Hill

Alexandra.SalterBlanc@ch2m.com

ATTN: Alexandra SalterBlanc

Total number of pages in report: **13**



Test results contained within this data package meet the requirements
of the National Environmental Laboratory Accreditation Program
and/or state specific certification programs as applicable.



Nancy Cole
Laboratory Director

Client Service contact: Marty Vitanza 732-329-0200

Certifications: NJ(12129), NY(10983), CA, CT, DE, FL, IL, IN, KS, KY, LA, MA, MD, MI, MT, NC,
OH VAP (CL0056), AK (UST-103), AZ (AZ0786), PA, RI, SC, TN, TX, VA, WV, DoD ELAP (L-A-B L2248)

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Test results relate only to samples analyzed.

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Sample Summary

CH2M Hill

Job No: JC14076

OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ
Project No: 477213

Sample Number	Collected Date	Time By	Received	Matrix Code	Type	Client Sample ID
JC14076-1	02/10/16	15:00 JAN	02/11/16	AQ	Water	LEACHATE A - 70 DAY
JC14076-2	02/10/16	15:15 JAN	02/11/16	AQ	Water	LEACHATE B - 70 DAY
JC14076-3	02/10/16	15:30 JAN	02/11/16	AQ	Water	CONTROL 1 - 9 DAY
JC14076-4	02/10/16	15:45 JAN	02/11/16	AQ	Water	CONTROL 2 - 9 DAY

Summary of Hits

Page 1 of 1

Job Number: JC14076**Account:** CH2M Hill**Project:** OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ**Collected:** 02/10/16

Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
---------------	------------------	-----------------	----	-----	-------	--------

JC14076-1 LEACHATE A - 70 DAY

Benzene	338000	1300	590	ug/l	SW846 8260C
1,2-Dichlorobenzene	4190	2500	460	ug/l	SW846 8260C
Naphthalene	4180 J	13000	510	ug/l	SW846 8260C
Toluene	53600	2500	410	ug/l	SW846 8260C
Xylene (total)	3960	2500	410	ug/l	SW846 8260C

JC14076-2 LEACHATE B - 70 DAY

Acetone	1140 J	2500	830	ug/l	SW846 8260C
Benzene	40400	130	59	ug/l	SW846 8260C
1,2-Dichlorobenzene	355	250	46	ug/l	SW846 8260C
Naphthalene	1010 J	1300	51	ug/l	SW846 8260C
Toluene	4470	250	41	ug/l	SW846 8260C
Xylene (total)	408	250	41	ug/l	SW846 8260C

JC14076-3 CONTROL 1 - 9 DAY

Benzene	150000	500	240	ug/l	SW846 8260C
1,2-Dichlorobenzene	508 J	1000	190	ug/l	SW846 8260C
Naphthalene	669 J	5000	200	ug/l	SW846 8260C
Toluene	8550	1000	160	ug/l	SW846 8260C
Xylene (total)	552 J	1000	170	ug/l	SW846 8260C

JC14076-4 CONTROL 2 - 9 DAY

Benzene	564000	2500	1200	ug/l	SW846 8260C
1,2-Dichlorobenzene	8470	5000	930	ug/l	SW846 8260C
Naphthalene	6330 J	25000	1000	ug/l	SW846 8260C
Toluene	90400	5000	810	ug/l	SW846 8260C
Xylene (total)	4400 J	5000	830	ug/l	SW846 8260C



Sample Results

Report of Analysis

Report of Analysis

Page 1 of 1

Client Sample ID:	LEACHATE A - 70 DAY			Date Sampled:	02/10/16
Lab Sample ID:	JC14076-1			Date Received:	02/11/16
Matrix:	AQ - Water			Percent Solids:	n/a
Method:	SW846 8260C				
Project:	OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ				

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2A165570.D	2500	02/12/16	TK	n/a	n/a	V2A7041
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25000	8300	ug/l	
71-43-2	Benzene	338000	1300	590	ug/l	
95-50-1	1,2-Dichlorobenzene	4190	2500	460	ug/l	
91-20-3	Naphthalene	4180	13000	510	ug/l	J
108-88-3	Toluene	53600	2500	410	ug/l	
1330-20-7	Xylene (total)	3960	2500	410	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	104%		76-120%
17060-07-0	1,2-Dichloroethane-D4	95%		73-122%
2037-26-5	Toluene-D8	104%		84-119%
460-00-4	4-Bromofluorobenzene	103%		78-117%

ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

Report of Analysis

Page 1 of 1

Client Sample ID:	LEACHATE B - 70 DAY			Date Sampled:	02/10/16
Lab Sample ID:	JC14076-2			Date Received:	02/11/16
Matrix:	AQ - Water			Percent Solids:	n/a
Method:	SW846 8260C				
Project:	OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ				

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2A165568.D	250	02/12/16	TK	n/a	n/a	V2A7041
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	1140	2500	830	ug/l	J
71-43-2	Benzene	40400	130	59	ug/l	
95-50-1	1,2-Dichlorobenzene	355	250	46	ug/l	
91-20-3	Naphthalene	1010	1300	51	ug/l	J
108-88-3	Toluene	4470	250	41	ug/l	
1330-20-7	Xylene (total)	408	250	41	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	104%		76-120%
17060-07-0	1,2-Dichloroethane-D4	94%		73-122%
2037-26-5	Toluene-D8	104%		84-119%
460-00-4	4-Bromofluorobenzene	104%		78-117%

ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

Report of Analysis

Page 1 of 1

Client Sample ID:	CONTROL 1 - 9 DAY			Date Sampled:	02/10/16
Lab Sample ID:	JC14076-3			Date Received:	02/11/16
Matrix:	AQ - Water			Percent Solids:	n/a
Method:	SW846 8260C				
Project:	OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ				

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2A165569.D	1000	02/12/16	TK	n/a	n/a	V2A7041
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10000	3300	ug/l	
71-43-2	Benzene	150000	500	240	ug/l	
95-50-1	1,2-Dichlorobenzene	508	1000	190	ug/l	J
91-20-3	Naphthalene	669	5000	200	ug/l	J
108-88-3	Toluene	8550	1000	160	ug/l	
1330-20-7	Xylene (total)	552	1000	170	ug/l	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	104%		76-120%
17060-07-0	1,2-Dichloroethane-D4	94%		73-122%
2037-26-5	Toluene-D8	105%		84-119%
460-00-4	4-Bromofluorobenzene	103%		78-117%

ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

Report of Analysis

Page 1 of 1

Client Sample ID:	CONTROL 2 - 9 DAY			Date Sampled:	02/10/16
Lab Sample ID:	JC14076-4			Date Received:	02/11/16
Matrix:	AQ - Water			Percent Solids:	n/a
Method:	SW846 8260C				
Project:	OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ				

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2A165571.D	5000	02/12/16	TK	n/a	n/a	V2A7041
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	50000	17000	ug/l	
71-43-2	Benzene	564000	2500	1200	ug/l	
95-50-1	1,2-Dichlorobenzene	8470	5000	930	ug/l	
91-20-3	Naphthalene	6330	25000	1000	ug/l	J
108-88-3	Toluene	90400	5000	810	ug/l	
1330-20-7	Xylene (total)	4400	5000	830	ug/l	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	105%		76-120%
17060-07-0	1,2-Dichloroethane-D4	96%		73-122%
2037-26-5	Toluene-D8	104%		84-119%
460-00-4	4-Bromofluorobenzene	104%		78-117%

ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

225 Route 100, Dayton, NJ 08811
TEL: 732-224-6000 FAX: 732-224-7490
www.accutest.com

REC EX Tracking #	2294 7489 6518	State Order Control #	NJ 213 2916 2444
Accutest Order #		ACCMERX REF	JC14076

Client / Reporting Information				Project Information				Requested Analysis (see TEST CODE sheet)												Matrix Codes
Company Name CH2MHill				Project Name Old American Cyanamid Superfund Site																CW - Drinking Water GW - Ground Water MW - Water SW - Surface Water SS - Soil SLD - Sediment CS - CS LC - Landfill AIR - Air SOL - Other Solid JP - JP EPC - EPC EPC - EPC RP - RP TB - TB
Street Address				Street																
City State Zip				City State Company Name																
Project Contact Jeff Morrison				Project #																
Phone # 339-927-2402				Fax #				Client Purchase Order #				City State Zip								
Sample Name Jarrett Nelson				Phone # 512-263-2101				Project Manager Jeff Morrison				Address								
Sample		Field ID - Point of Collection		Method		Date		Time		Sampled By		Matrix		Volume		Number of Preserves		Matrix Codes		
1		Leachate A - 70 day				2/10/16		15:00		JAN		LIQ		3		1		1		
2		Leachate B - 70 day				2/10/16		15:15		JAN		LIQ		3		1		2		
3		Control 1 - 9 day				2/10/16		15:30		JAN		LIQ		3		1		3		
4		Control 2 - 9 day				2/10/16		15:45		JAN		LIQ		3		1		1		
Turnaround Time: Business days <input type="checkbox"/> Std. 10 Business Days <input type="checkbox"/> 5 Day RUSH <input type="checkbox"/> 1 Day RUSH <input checked="" type="checkbox"/> 2 Day RUSH <input type="checkbox"/> 1 Day RUSH <input type="checkbox"/> Other																				
Approved By: Accutest File #				Date				<input type="checkbox"/> Commercial "A" (Level 1) <input type="checkbox"/> Commercial "B" (Level 2) <input type="checkbox"/> PUBLIC (Level 3-4) <input type="checkbox"/> Reduced <input type="checkbox"/> Commercial "C" <input type="checkbox"/> NJ Data of Known Quality Protocol Reporting				<input type="checkbox"/> IIRASP Category A <input type="checkbox"/> IIRASP Category B <input type="checkbox"/> State Forms <input type="checkbox"/> EDD Format <input type="checkbox"/> Other				Volatiles - Test for Acetone, Benzene, 1,2-DCB, Naphthalene, Toluene and Xylene Contact Jeff Morrison or Mary Wilkins with questions.				
Emergency & Rush T.A. data available - 7A Labors				Sample Custody must be documented below each time samples change possession, including courier delivery				NJ Reduced = Results + QC Summary + Return Raw data Commercial "A" = Results Only Commercial "B" = Results + QC Summary				Sample inventory is verified upon receipt in the Laboratory								
Relinquished by		Date/Time		Received By		Date/Time		Relinquished by		Date/Time		Received By		Date/Time		Received By		Date/Time		
1		2/10/2016		1		FedEx		2		9/10 2/11/16		2				3				
3				3				4				4				4				
5				5				5				5				5				
Sampled Seal # <input type="checkbox"/> 1000 <input type="checkbox"/> 2000 <input type="checkbox"/> 3000 <input type="checkbox"/> 4000 <input type="checkbox"/> 5000 <input type="checkbox"/> 6000 <input type="checkbox"/> 7000 <input type="checkbox"/> 8000 <input type="checkbox"/> 9000 <input type="checkbox"/> 10000																				

JC14076: Chain of Custody

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Accutest Laboratories Sample Receipt Summary

Accutest Job Number: JC14076

Client: CH2MHILL

Project: OU8 AMERICAN CYANAMID SUPER FUND SITE

Date / Time Received: 2/11/2016 9:30:00 AM

Delivery Method: FedEx

Airbill #s: 8094 7489 6618

Cooler Temps (Raw Measured) °C: Cooler 1: (1.1);

Cooler Temps (Corrected) °C: Cooler 1: (1.5);

Cooler Security

Y or N

Y or N

- | | | | | | |
|---------------------------|-------------------------------------|--------------------------|-----------------------|-------------------------------------|--------------------------|
| 1. Custody Seals Present: | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 3. COC Present: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. Custody Seals Intact: | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 4. Smpl Dates/Time OK | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Cooler Temperature

Y or N

- | | | |
|------------------------------|-------------------------------------|--------------------------|
| 1. Temp criteria achieved: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. Cooler temp verification: | IR Gun | |
| 3. Cooler media: | Ice (Bag) | |
| 4. No. Coolers | 1 | |

Quality Control Preservation

Y

N

N/A

- | | | | |
|---------------------------------|-------------------------------------|-------------------------------------|--------------------------|
| 1. Trip Blank present / cooler: | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. Trip Blank listed on COC: | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 3. Samples preserved properly: | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| 4. VOCs headspace free: | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Sample Integrity - Documentation

Y or N

- | | | |
|--|-------------------------------------|--------------------------|
| 1. Sample labels present on bottles: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. Container labeling complete: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 3. Sample container label / COC agree: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Sample Integrity - Condition

Y or N

- | | | |
|----------------------------------|-------------------------------------|--------------------------|
| 1. Sample recvd within HT: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. All containers accounted for: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 3. Condition of sample: | Intact | |

Sample Integrity - Instructions

Y

N

N/A

- | | | | |
|---|-------------------------------------|-------------------------------------|-------------------------------------|
| 1. Analysis requested is clear: | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| 2. Bottles received for unspecified tests | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| 3. Sufficient volume recvd for analysis: | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| 4. Compositing instructions clear: | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 5. Filtering instructions clear: | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Comments 1) -1 AND -4 3 OF 3 VOA'S HAVE MACROBUBBLES
-2 AND -3 2 OF 3 VOA'S VOA'S HAVE MACROBUBBLES

Accutest Laboratories
V:732.329.0200

2235 US Highway 130
F: 732.329.3499

Dayton, New Jersey
www.accutest.com

JC14076: Chain of Custody

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Sample Receipt Summary - Problem Resolution

Accutest Job Number: JC14076

Initiator: BOBL

CSR: MV

Response Date: 2/11/2016

Response: Proceed as noted...

4.1
4

Accutest Laboratories
V: 732.329.0200

2235 US Highway 130
F: 732.329.3499

Dayton, New Jersey
www.accutest.com

JC14076: Chain of Custody
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Technical Report for

CH2M Hill

OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ

477213

SGS Accutest Job Number: JC15397

Sampling Date: 03/03/16

Report to:

CH2M Hill

Alexandra.SalterBlanc@ch2m.com

ATTN: Alexandra SalterBlanc

Total number of pages in report: **13**



Test results contained within this data package meet the requirements
of the National Environmental Laboratory Accreditation Program
and/or state specific certification programs as applicable.

Nancy F. Cole

Nancy Cole
Laboratory Director

Client Service contact: Marty Vitanza 732-329-0200

Certifications: NJ(12129), NY(10983), CA, CT, DE, FL, IL, IN, KS, KY, LA, MA, MD, MI, MT, NC,
OH VAP (CL0056), AK (UST-103), AZ (AZ0786), PA, RI, SC, TN, TX, VA, WV, DoD ELAP (L-A-B L2248)

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Test results relate only to samples analyzed.

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Sample Summary

CH2M Hill

Job No: JC15397

OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ
Project No: 477213

Sample Number	Collected Date	Time By	Received	Matrix Code	Type	Client Sample ID
JC15397-1	03/03/16	14:15 JAN	03/04/16	AQ	Water	LEACHATE A - 92 DAY
JC15397-2	03/03/16	14:30 JAN	03/04/16	AQ	Water	LEACHATE B - 92 DAY
JC15397-3	03/03/16	14:45 JAN	03/04/16	AQ	Water	CONTROL 1 - 31 DAY
JC15397-4	03/03/16	15:00 JAN	03/04/16	AQ	Water	CONTROL 2 - 31 DAY

Summary of Hits

Page 1 of 1

Job Number: JC15397**Account:** CH2M Hill**Project:** OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ**Collected:** 03/03/16

Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
---------------	------------------	-----------------	----	-----	-------	--------

JC15397-1 LEACHATE A - 92 DAY

Acetone	4520	2500	830	ug/l	SW846 8260C
Benzene	230000	2500	1200	ug/l	SW846 8260C
1,2-Dichlorobenzene	226 J	250	46	ug/l	SW846 8260C
Naphthalene	189 J	1300	51	ug/l	SW846 8260C
Toluene	13400	250	41	ug/l	SW846 8260C
Xylene (total)	295	250	41	ug/l	SW846 8260C

JC15397-2 LEACHATE B - 92 DAY

Acetone	1330	500	170	ug/l	SW846 8260C
Benzene	36900	500	240	ug/l	SW846 8260C
1,2-Dichlorobenzene	103	50	9.3	ug/l	SW846 8260C
Naphthalene	184 J	250	10	ug/l	SW846 8260C
Toluene	3330	50	8.1	ug/l	SW846 8260C
Xylene (total)	187	50	8.3	ug/l	SW846 8260C

JC15397-3 CONTROL 1 - 31 DAY

Acetone	2930	2500	830	ug/l	SW846 8260C
Benzene	137000	2500	1200	ug/l	SW846 8260C
1,2-Dichlorobenzene	99.2 J	250	46	ug/l	SW846 8260C
Toluene	5020	250	41	ug/l	SW846 8260C

JC15397-4 CONTROL 2 - 31 DAY

Acetone	4190 J	5000	1700	ug/l	SW846 8260C
Benzene	301000	5000	2400	ug/l	SW846 8260C
1,2-Dichlorobenzene	875	500	93	ug/l	SW846 8260C
Naphthalene	712 J	2500	100	ug/l	SW846 8260C
Toluene	20800	500	81	ug/l	SW846 8260C
Xylene (total)	592	500	83	ug/l	SW846 8260C



Sample Results

Report of Analysis

Report of Analysis

Page 1 of 1

Client Sample ID:	LEACHATE A - 92 DAY			Date Sampled:	03/03/16
Lab Sample ID:	JC15397-1			Date Received:	03/04/16
Matrix:	AQ - Water			Percent Solids:	n/a
Method:	SW846 8260C				
Project:	OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ				

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	U203966.D	250	03/07/16	NH	n/a	n/a	VU9376
Run #2	U203964.D	5000	03/07/16	NH	n/a	n/a	VU9376

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	4520	2500	830	ug/l	
71-43-2	Benzene	230000 ^a	2500	1200	ug/l	
95-50-1	1,2-Dichlorobenzene	226	250	46	ug/l	J
91-20-3	Naphthalene	189	1300	51	ug/l	J
108-88-3	Toluene	13400	250	41	ug/l	
1330-20-7	Xylene (total)	295	250	41	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	103%	103%	76-120%
17060-07-0	1,2-Dichloroethane-D4	104%	103%	73-122%
2037-26-5	Toluene-D8	101%	99%	84-119%
460-00-4	4-Bromofluorobenzene	100%	101%	78-117%

(a) Result is from Run# 2

ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

Report of Analysis

Page 1 of 1

Client Sample ID:	LEACHATE B - 92 DAY	Date Sampled:	03/03/16
Lab Sample ID:	JC15397-2	Date Received:	03/04/16
Matrix:	AQ - Water	Percent Solids:	n/a
Method:	SW846 8260C		
Project:	OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	U203967.D	50	03/07/16	NH	n/a	n/a	VU9376
Run #2	U203965.D	1000	03/07/16	NH	n/a	n/a	VU9376

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	1330	500	170	ug/l	
71-43-2	Benzene	36900 ^a	500	240	ug/l	
95-50-1	1,2-Dichlorobenzene	103	50	9.3	ug/l	
91-20-3	Naphthalene	184	250	10	ug/l	J
108-88-3	Toluene	3330	50	8.1	ug/l	
1330-20-7	Xylene (total)	187	50	8.3	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	103%	102%	76-120%
17060-07-0	1,2-Dichloroethane-D4	104%	103%	73-122%
2037-26-5	Toluene-D8	100%	98%	84-119%
460-00-4	4-Bromofluorobenzene	101%	101%	78-117%

(a) Result is from Run# 2

ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

Report of Analysis

Page 1 of 1

Client Sample ID:	CONTROL 1 - 31 DAY			Date Sampled:	03/03/16
Lab Sample ID:	JC15397-3			Date Received:	03/04/16
Matrix:	AQ - Water			Percent Solids:	n/a
Method:	SW846 8260C				
Project:	OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ				

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2D153492.D	250	03/07/16	AM	n/a	n/a	V2D6453
Run #2	2D153490.D	5000	03/07/16	AM	n/a	n/a	V2D6453

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	2930	2500	830	ug/l	
71-43-2	Benzene	137000 ^a	2500	1200	ug/l	
95-50-1	1,2-Dichlorobenzene	99.2	250	46	ug/l	J
91-20-3	Naphthalene	ND	1300	51	ug/l	
108-88-3	Toluene	5020	250	41	ug/l	
1330-20-7	Xylene (total)	ND	250	41	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	101%	100%	76-120%
17060-07-0	1,2-Dichloroethane-D4	100%	100%	73-122%
2037-26-5	Toluene-D8	102%	99%	84-119%
460-00-4	4-Bromofluorobenzene	100%	100%	78-117%

(a) Result is from Run# 2

ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

Report of Analysis

Page 1 of 1

Client Sample ID:	CONTROL 2 - 31 DAY			Date Sampled:	03/03/16
Lab Sample ID:	JC15397-4			Date Received:	03/04/16
Matrix:	AQ - Water			Percent Solids:	n/a
Method:	SW846 8260C				
Project:	OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ				

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2D153493.D	500	03/07/16	AM	n/a	n/a	V2D6453
Run #2	2D153491.D	10000	03/07/16	AM	n/a	n/a	V2D6453

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	4190	5000	1700	ug/l	J
71-43-2	Benzene	301000 ^a	5000	2400	ug/l	
95-50-1	1,2-Dichlorobenzene	875	500	93	ug/l	
91-20-3	Naphthalene	712	2500	100	ug/l	J
108-88-3	Toluene	20800	500	81	ug/l	
1330-20-7	Xylene (total)	592	500	83	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	99%	100%	76-120%
17060-07-0	1,2-Dichloroethane-D4	99%	100%	73-122%
2037-26-5	Toluene-D8	102%	101%	84-119%
460-00-4	4-Bromofluorobenzene	101%	100%	78-117%

(a) Result is from Run# 2

ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound



Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

Job Number: JC15397

Client: CH2MHILL

Project: QU8 American Cyanamid

Date / Time Received: 3/4/2016 9:15:00 AM

Delivery Method: FedEx

Airbill #s: 809474896662

Cooler Temps (Raw Measured) °C: Cooler 1: (1.6);

Cooler Temps (Corrected) °C: Cooler 1: (2.0);

Cooler SecurityY or N

- | | | | | | |
|---------------------------|-------------------------------------|--------------------------|-----------------------|-------------------------------------|--------------------------|
| 1. Custody Seals Present: | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 3. COC Present: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. Custody Seals Intact: | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 4. Smpl Dates/Time OK | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Cooler TemperatureY or N

- | | | |
|------------------------------|-------------------------------------|--------------------------|
| 1. Temp criteria achieved: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. Cooler temp verification: | IR Gun | |
| 3. Cooler media: | Ice (Bag) | |
| 4. No. Coolers: | 1 | |

Quality Control PreservationY or N N/A

- | | | | |
|---------------------------------|-------------------------------------|-------------------------------------|--------------------------|
| 1. Trip Blank present / cooler: | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. Trip Blank listed on COC: | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 3. Samples preserved properly: | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| 4. VOCs headspace free: | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Sample Integrity - DocumentationY or N

- | | | |
|--|-------------------------------------|--------------------------|
| 1. Sample labels present on bottles: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. Container labeling complete: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 3. Sample container label / COC agree: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Sample Integrity - ConditionY or N

- | | | |
|----------------------------------|-------------------------------------|--------------------------|
| 1. Sample recvd within HT: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. All containers accounted for: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 3. Condition of sample: | Intact | |

Sample Integrity - InstructionsY or N N/A

- | | | | |
|---|-------------------------------------|-------------------------------------|-------------------------------------|
| 1. Analysis requested is clear: | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| 2. Bottles received for unspecified tests | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| 3. Sufficient volume recvd for analysis: | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| 4. Compositing instructions clear: | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 5. Filtering instructions clear: | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Comments

- 1) 1-4: 3 of 3 vials rec'd with macrobubbles, no screen provided.

Accutest Laboratories
V: 732.329.02002235 US Highway 130
F: 732.329.3499Dayton, New J
www.accutest.

JC15397: Chain of Custody

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Problem Resolution

Accutest Job Number: JC15397

CSR: _____

Response Date: 3/4/2016

Response: Proceed with analysis

4.1
4

JC15397: Chain of Custody
Page 3 of 3

Technical Report for

CH2M Hill

OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ

477213

SGS Accutest Job Number: JC16132

Sampling Date: 03/11/16

Report to:

CH2M Hill

Alexandra.SalterBlanc@ch2m.com

ATTN: Alexandra SalterBlanc

Total number of pages in report: **10**



Test results contained within this data package meet the requirements
of the National Environmental Laboratory Accreditation Program
and/or state specific certification programs as applicable.

Nancy F. Cole

Nancy Cole
Laboratory Director

Client Service contact: Marty Vitanza 732-329-0200

Certifications: NJ(12129), NY(10983), CA, CT, DE, FL, IL, IN, KS, KY, LA, MA, MD, MI, MT, NC,
OH VAP (CL0056), AK (UST-103), AZ (AZ0786), PA, RI, SC, TN, TX, VA, WV, DoD ELAP (L-A-B L2248)

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Test results relate only to samples analyzed.

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Sample Summary

CH2M Hill

Job No: JC16132

OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ
Project No: 477213

Sample Number	Collected		Matrix Code Type	Client Sample ID
	Date	Time By	Received	
JC16132-1	03/11/16	10:00 JAN	03/12/16 AQ Water	LEACHATE A - 100 DAY
JC16132-2	03/11/16	10:15 JAN	03/12/16 AQ Water	LEACHATE B - 100 DAY

Summary of Hits

Page 1 of 1

Job Number: JC16132

Account: CH2M Hill

Project: OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ

Collected: 03/11/16

Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
---------------	------------------	-----------------	----	-----	-------	--------

JC16132-1 LEACHATE A - 100 DAY

Acetone	3810	2500	830	ug/l	SW846 8260C
Benzene	282000	1300	590	ug/l	SW846 8260C
1,2-Dichlorobenzene	853	250	46	ug/l	SW846 8260C
Naphthalene	769 J	1300	51	ug/l	SW846 8260C
Toluene	21800	250	41	ug/l	SW846 8260C
Xylene (total)	797	250	41	ug/l	SW846 8260C

JC16132-2 LEACHATE B - 100 DAY

Acetone	1110	1000	330	ug/l	SW846 8260C
Benzene	43200	500	240	ug/l	SW846 8260C
1,2-Dichlorobenzene	155	100	19	ug/l	SW846 8260C
Naphthalene	228 J	500	20	ug/l	SW846 8260C
Toluene	3900	100	16	ug/l	SW846 8260C
Xylene (total)	238	100	17	ug/l	SW846 8260C



Sample Results

Report of Analysis

Report of Analysis

Page 1 of 1

Client Sample ID:	LEACHATE A - 100 DAY	Date Sampled:	03/11/16
Lab Sample ID:	JC16132-1	Date Received:	03/12/16
Matrix:	AQ - Water	Percent Solids:	n/a
Method:	SW846 8260C		
Project:	OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2D153736.D	250	03/16/16	AM	n/a	n/a	V2D6463
Run #2	2D153737.D	2500	03/16/16	AM	n/a	n/a	V2D6463

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	3810	2500	830	ug/l	
71-43-2	Benzene	282000 ^a	1300	590	ug/l	
95-50-1	1,2-Dichlorobenzene	853	250	46	ug/l	
91-20-3	Naphthalene	769	1300	51	ug/l	J
108-88-3	Toluene	21800	250	41	ug/l	
1330-20-7	Xylene (total)	797	250	41	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	102%	103%	76-120%
17060-07-0	1,2-Dichloroethane-D4	104%	104%	73-122%
2037-26-5	Toluene-D8	103%	102%	84-119%
460-00-4	4-Bromofluorobenzene	99%	100%	78-117%

(a) Result is from Run# 2

ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

Report of Analysis

Page 1 of 1

Client Sample ID:	LEACHATE B - 100 DAY	Date Sampled:	03/11/16
Lab Sample ID:	JC16132-2	Date Received:	03/12/16
Matrix:	AQ - Water	Percent Solids:	n/a
Method:	SW846 8260C		
Project:	OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2D153734.D	100	03/16/16	AM	n/a	n/a	V2D6463
Run #2	2D153735.D	1000	03/16/16	AM	n/a	n/a	V2D6463

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	1110	1000	330	ug/l	
71-43-2	Benzene	43200 ^a	500	240	ug/l	
95-50-1	1,2-Dichlorobenzene	155	100	19	ug/l	
91-20-3	Naphthalene	228	500	20	ug/l	J
108-88-3	Toluene	3900	100	16	ug/l	
1330-20-7	Xylene (total)	238	100	17	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	101%	101%	76-120%
17060-07-0	1,2-Dichloroethane-D4	103%	102%	73-122%
2037-26-5	Toluene-D8	103%	101%	84-119%
460-00-4	4-Bromofluorobenzene	99%	99%	78-117%

(a) Result is from Run# 2

ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound



Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

SGS Accutest Sample Receipt Summary

Job Number: JC16132

Client: _____

Project: _____

Date / Time Received: 3/12/2016 9:45:00 AM

Delivery Method: _____

Airbill #s: _____

Cooler Temps (Raw Measured) °C: Cooler 1: (2.2);

Cooler Temps (Corrected) °C: Cooler 1: (2.6);

Cooler Security

Y or N

- | | | | | | |
|---------------------------|-------------------------------------|--------------------------|-----------------------|-------------------------------------|--------------------------|
| 1. Custody Seals Present: | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 3. COC Present: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. Custody Seals Intact: | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 4. Smpl Dates/Time OK | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Cooler Temperature

Y or N

- | | | |
|------------------------------|-------------------------------------|--------------------------|
| 1. Temp criteria achieved: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. Cooler temp verification: | IR Gun | |
| 3. Cooler media: | Ice (Bag) | |
| 4. No. Coolers: | 1 | |

Quality Control Preservation

Y or N

N/A

- | | | | |
|---------------------------------|-------------------------------------|--------------------------|-------------------------------------|
| 1. Trip Blank present / cooler: | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 2. Trip Blank listed on COC: | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 3. Samples preserved properly: | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| 4. VOCs headspace free: | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Sample Integrity - Documentation

Y or N

- | | | |
|--|-------------------------------------|--------------------------|
| 1. Sample labels present on bottles: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. Container labeling complete: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 3. Sample container label / COC agree: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Sample Integrity - Condition

Y or N

- | | | |
|----------------------------------|-------------------------------------|--------------------------|
| 1. Sample recvd within HT: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. All containers accounted for: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 3. Condition of sample: | Intact | |

Sample Integrity - Instructions

Y or N N/A

- | | | | |
|---|-------------------------------------|-------------------------------------|-------------------------------------|
| 1. Analysis requested is clear: | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| 2. Bottles received for unspecified tests | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| 3. Sufficient volume recvd for analysis: | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| 4. Compositing instructions clear: | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 5. Filtering instructions clear: | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Comments

JC16132: Chain of Custody

Page 2 of 2

Technical Report for

CH2M Hill

OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ

477213

SGS Accutest Job Number: JC17412

Sampling Date: 03/31/16

Report to:

CH2M Hill

Alexandra.SalterBlanc@ch2m.com

ATTN: Alexandra SalterBlanc

Total number of pages in report: **13**



Test results contained within this data package meet the requirements
of the National Environmental Laboratory Accreditation Program
and/or state specific certification programs as applicable.

Nancy F. Cole

Nancy Cole
Laboratory Director

Client Service contact: Marty Vitanza 732-329-0200

Certifications: NJ(12129), NY(10983), CA, CT, DE, FL, IL, IN, KS, KY, LA, MA, MD, MI, MT, NC,
OH VAP (CL0056), AK (UST-103), AZ (AZ0786), PA, RI, SC, TN, TX, VA, WV, DoD ELAP (L-A-B L2248)

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Sample Summary

CH2M Hill

Job No: JC17412

OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ
Project No: 477213

Sample Number	Collected		Matrix Code	Type	Client Sample ID
	Date	Time By			
JC17412-1	03/31/16	14:00 JAN	04/01/16	AQ Water	LEACHATE A - 120 DAY
JC17412-2	03/31/16	14:15 JAN	04/01/16	AQ Water	LEACHATE B - 120 DAY

Summary of Hits

Page 1 of 1

Job Number: JC17412

Account: CH2M Hill

Project: OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ

Collected: 03/31/16

Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
---------------	------------------	-----------------	----	-----	-------	--------

JC17412-1 LEACHATE A - 120 DAY

Acetone ^a	2630 J	10000	2000	ug/l	SW846 8260C
Benzene	275000	5000	2400	ug/l	SW846 8260C
1,2-Dichlorobenzene	323 J	1000	190	ug/l	SW846 8260C
Toluene	18900	1000	160	ug/l	SW846 8260C
Acetophenone	5470	400	42	ug/l	SW846 8270D

JC17412-2 LEACHATE B - 120 DAY

Benzene	48700	1300	590	ug/l	SW846 8260C
1,2-Dichlorobenzene	180 J	250	46	ug/l	SW846 8260C
Naphthalene	303 J	1300	51	ug/l	SW846 8260C
Toluene	4930	250	41	ug/l	SW846 8260C
Xylene (total)	273	250	41	ug/l	SW846 8260C
Acetophenone	8070	400	42	ug/l	SW846 8270D

(a) MDL from current instrument.

Sample Results

Report of Analysis

Report of Analysis

Page 1 of 1

Client Sample ID:	LEACHATE A - 120 DAY	Date Sampled:	03/31/16
Lab Sample ID:	JC17412-1	Date Received:	04/01/16
Matrix:	AQ - Water	Percent Solids:	n/a
Method:	SW846 8260C		
Project:	OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2C138061.D	1000	04/02/16	TP	n/a	n/a	V2C6202
Run #2	2C138062.D	10000	04/02/16	TP	n/a	n/a	V2C6202

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone ^a	2630	10000	2000	ug/l	J
71-43-2	Benzene	275000 ^b	5000	2400	ug/l	
95-50-1	1,2-Dichlorobenzene	323	1000	190	ug/l	J
91-20-3	Naphthalene	ND	5000	200	ug/l	
108-88-3	Toluene	18900	1000	160	ug/l	
1330-20-7	Xylene (total)	ND	1000	170	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	101%	100%	76-120%
17060-07-0	1,2-Dichloroethane-D4	94%	94%	73-122%
2037-26-5	Toluene-D8	104%	101%	84-119%
460-00-4	4-Bromofluorobenzene	95%	94%	78-117%

(a) MDL from current instrument.

(b) Result is from Run# 2

ND = Not detected MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

N = Indicates presumptive evidence of a compound

Report of Analysis

Page 1 of 1

Client Sample ID:	LEACHATE A - 120 DAY	Date Sampled:	03/31/16
Lab Sample ID:	JC17412-1	Date Received:	04/01/16
Matrix:	AQ - Water	Percent Solids:	n/a
Method:	SW846 8270D SW846 3510C		
Project:	OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2P57867.D	1	04/05/16	SD	04/04/16	OP92746	E2P2526
Run #2	3P52203.D	200	04/05/16	RL	04/04/16	OP92746	E3P2374

	Initial Volume	Final Volume
Run #1	1000 ml	1.0 ml
Run #2	1000 ml	1.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
98-86-2	Acetophenone	5470 ^a	400	42	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	76%	0% ^b	14-88%
4165-62-2	Phenol-d5	45%	0% ^b	10-110%
118-79-6	2,4,6-Tribromophenol	108%	0% ^b	39-149%
4165-60-0	Nitrobenzene-d5	105%	0% ^b	32-128%
321-60-8	2-Fluorobiphenyl	79%	0% ^b	35-119%
1718-51-0	Terphenyl-d14	81%	0% ^b	10-126%

(a) Result is from Run# 2

(b) Outside control limits due to dilution.

ND = Not detected MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

N = Indicates presumptive evidence of a compound

Report of Analysis

Page 1 of 1

Client Sample ID:	LEACHATE B - 120 DAY	Date Sampled:	03/31/16
Lab Sample ID:	JC17412-2	Date Received:	04/01/16
Matrix:	AQ - Water	Percent Solids:	n/a
Method:	SW846 8260C		
Project:	OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2C138059.D	250	04/02/16	TP	n/a	n/a	V2C6202
Run #2	2C138060.D	2500	04/02/16	TP	n/a	n/a	V2C6202

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	2500	830	ug/l	
71-43-2	Benzene	48700 ^a	1300	590	ug/l	
95-50-1	1,2-Dichlorobenzene	180	250	46	ug/l	J
91-20-3	Naphthalene	303	1300	51	ug/l	J
108-88-3	Toluene	4930	250	41	ug/l	
1330-20-7	Xylene (total)	273	250	41	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	100%	101%	76-120%
17060-07-0	1,2-Dichloroethane-D4	94%	94%	73-122%
2037-26-5	Toluene-D8	101%	100%	84-119%
460-00-4	4-Bromofluorobenzene	94%	96%	78-117%

(a) Result is from Run# 2

ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

Report of Analysis

Page 1 of 1

Client Sample ID:	LEACHATE B - 120 DAY	Date Sampled:	03/31/16
Lab Sample ID:	JC17412-2	Date Received:	04/01/16
Matrix:	AQ - Water	Percent Solids:	n/a
Method:	SW846 8270D SW846 3510C		
Project:	OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2P57868.D	1	04/05/16	SD	04/04/16	OP92746	E2P2526
Run #2	3P52204.D	200	04/05/16	RL	04/04/16	OP92746	E3P2374

	Initial Volume	Final Volume
Run #1	1000 ml	1.0 ml
Run #2	1000 ml	1.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
98-86-2	Acetophenone	8070 ^a	400	42	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	56%	0% ^b	14-88%
4165-62-2	Phenol-d5	34%	0% ^b	10-110%
118-79-6	2,4,6-Tribromophenol	118%	0% ^b	39-149%
4165-60-0	Nitrobenzene-d5	86%	0% ^b	32-128%
321-60-8	2-Fluorobiphenyl	83%	0% ^b	35-119%
1718-51-0	Terphenyl-d14	73%	0% ^b	10-126%

(a) Result is from Run# 2

(b) Outside control limits due to dilution.

ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound



Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

SGS Accutest Sample Receipt Summary

Job Number: JC17412

Client: CH2MHill

Project: OU8 American Cyanamid Superfund

Date / Time Received: 4/1/2016 9:30:00 AM

Delivery Method: FedEx

Airbill #s: 8094 7489 6824

Cooler Temps (Raw Measured) °C: Cooler 1: (1.8);

Cooler Temps (Corrected) °C: Cooler 1: (2.2);

Cooler Security
Y or N
Y or N

- | | | | | | |
|---------------------------|-------------------------------------|--------------------------|-----------------------|-------------------------------------|--------------------------|
| 1. Custody Seals Present: | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 3. COC Present: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. Custody Seals Intact: | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 4. Smpl Dates/Time OK | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Cooler Temperature
Y or N

- | | | |
|------------------------------|-------------------------------------|--------------------------|
| 1. Temp criteria achieved: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. Cooler temp verification: | IR Gun | |
| 3. Cooler media: | Ice (Bag) | |
| 4. No. Coolers | 1 | |

Quality Control Preservation
Y
N
N/A

- | | | | |
|---------------------------------|--------------------------|-------------------------------------|--------------------------|
| 1. Trip Blank present / cooler: | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. Trip Blank listed on COC: | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 3. Samples preserved properly: | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 4. VOCs headspace free: | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Sample Integrity - Documentation
Y or N

- | | | |
|--|-------------------------------------|--------------------------|
| 1. Sample labels present on bottles: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. Container labeling complete: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 3. Sample container label / COC agree: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Sample Integrity - Condition
Y or N

- | | | |
|----------------------------------|-------------------------------------|--------------------------|
| 1. Sample recvd within HT: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. All containers accounted for: | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 3. Condition of sample: | Intact | |

Sample Integrity - Instructions
Y
N
N/A

- | | | | |
|---|-------------------------------------|-------------------------------------|-------------------------------------|
| 1. Analysis requested is clear: | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| 2. Bottles received for unspecified tests | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| 3. Sufficient volume recvd for analysis: | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| 4. Compositing instructions clear: | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 5. Filtering instructions clear: | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Comments

Received HCL voa vials although TCLP Volatiles would require unpreserved volume.
 The matrix is most likely an odorous wastewater although it is listed as LIQ. Can we confirm what the matrix should be.
 -1: 2 of 3 voa vials have macrobubbles; -2: 1 of 3 voa vials has macrobubble.

JC17412: Chain of Custody

Page 2 of 3

Sample Receipt Summary - Problem Resolution

Job Number: JC17412

Initiator: timh

CSR: MV

Response Date: 4/1/2016

Response: These are already leached and submitted to us for VOC's and SVOC. To be logged in for the tests listed in the lower right section of the chain (in the comments field)

4.1

4

JC17412: Chain of Custody

Page 3 of 3

Technical Report for

CH2M Hill

OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ

477213

SGS Accutest Job Number: JC17413

Sampling Date: 03/31/16

Report to:

CH2M Hill

Alexandra.SalterBlanc@ch2m.com

ATTN: Alexandra SalterBlanc

Total number of pages in report: 11



Test results contained within this data package meet the requirements
of the National Environmental Laboratory Accreditation Program
and/or state specific certification programs as applicable.

Nancy F. Cole

Nancy Cole
Laboratory Director

Client Service contact: Marty Vitanza 732-329-0200

Certifications: NJ(12129), NY(10983), CA, CT, DE, FL, IL, IN, KS, KY, LA, MA, MD, MI, MT, NC,
OH VAP (CL0056), AK (UST-103), AZ (AZ0786), PA, RI, SC, TN, TX, VA, WV, DoD ELAP (L-A-B L2248)

This report shall not be reproduced, except in its entirety, without the written approval of SGS Accutest.
Test results relate only to samples analyzed.

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3.2: JC17413-2: CONTROL 2 - 59 DAY 7

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4.1: Chain of Custody 9



Sample Summary

CH2M Hill

Job No: JC17413

OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ
Project No: 477213

Sample Number	Collected		Received	Matrix		Client Sample ID
	Date	Time By		Code	Type	
JC17413-1	03/31/16	14:30 JAN	04/01/16	AQ	Water	CONTROL 1 - 59 DAY
JC17413-2	03/31/16	14:45 JAN	04/01/16	AQ	Water	CONTROL 2 - 59 DAY

Summary of Hits

Page 1 of 1

Job Number: JC17413

Account: CH2M Hill

Project: OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ

Collected: 03/31/16

Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
---------------	------------------	-----------------	----	-----	-------	--------

JC17413-1 CONTROL 1 - 59 DAY

Acetone	2000 J	5000	1700	ug/l	SW846 8260C
Benzene	122000	2500	1200	ug/l	SW846 8260C
Toluene	4340	500	81	ug/l	SW846 8260C

JC17413-2 CONTROL 2 - 59 DAY

Benzene	258000	5000	2400	ug/l	SW846 8260C
1,2-Dichlorobenzene	529 J	1000	190	ug/l	SW846 8260C
Naphthalene	460 J	5000	200	ug/l	SW846 8260C
Toluene	15300	1000	160	ug/l	SW846 8260C

Sample Results

Report of Analysis

Report of Analysis

Page 1 of 1

Client Sample ID:	CONTROL 1 - 59 DAY			Date Sampled:	03/31/16
Lab Sample ID:	JC17413-1			Date Received:	04/01/16
Matrix:	AQ - Water			Percent Solids:	n/a
Method:	SW846 8260C				
Project:	OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ				

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2C138063.D	500	04/02/16	TP	n/a	n/a	V2C6202
Run #2	2C138064.D	5000	04/02/16	TP	n/a	n/a	V2C6202

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	2000	5000	1700	ug/l	J
71-43-2	Benzene	122000 ^a	2500	1200	ug/l	
95-50-1	1,2-Dichlorobenzene	ND	500	93	ug/l	
91-20-3	Naphthalene	ND	2500	100	ug/l	
108-88-3	Toluene	4340	500	81	ug/l	
1330-20-7	Xylene (total)	ND	500	83	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	99%	100%	76-120%
17060-07-0	1,2-Dichloroethane-D4	93%	93%	73-122%
2037-26-5	Toluene-D8	101%	100%	84-119%
460-00-4	4-Bromofluorobenzene	97%	94%	78-117%

(a) Result is from Run# 2

ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

Report of Analysis

Page 1 of 1

Client Sample ID:	CONTROL 2 - 59 DAY			Date Sampled:	03/31/16
Lab Sample ID:	JC17413-2			Date Received:	04/01/16
Matrix:	AQ - Water			Percent Solids:	n/a
Method:	SW846 8260C				
Project:	OU8 AmCy CAMU Liner, 20 Polhemus Lane, Bridgewater, NJ				

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	2C138065.D	1000	04/02/16	TP	n/a	n/a	V2C6202
Run #2	2C138066.D	10000	04/02/16	TP	n/a	n/a	V2C6202

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	10000	3300	ug/l	
71-43-2	Benzene	258000 ^a	5000	2400	ug/l	
95-50-1	1,2-Dichlorobenzene	529	1000	190	ug/l	J
91-20-3	Naphthalene	460	5000	200	ug/l	J
108-88-3	Toluene	15300	1000	160	ug/l	
1330-20-7	Xylene (total)	ND	1000	170	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	100%	100%	76-120%
17060-07-0	1,2-Dichloroethane-D4	93%	93%	73-122%
2037-26-5	Toluene-D8	101%	102%	84-119%
460-00-4	4-Bromofluorobenzene	92%	96%	78-117%

(a) Result is from Run# 2

ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound



Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

SGS Accutest Sample Receipt Summary

Job Number: JC17413

Client: CH2MHill

Project: OU8 American Cyanamid Superfund

Date / Time Received: 4/1/2016 9:30:00 AM

Delivery Method: FedEx

Airbill #s: 8094 7489 6824

Cooler Temps (Raw Measured) °C: Cooler 1: (1.8);

Cooler Temps (Corrected) °C: Cooler 1: (2.2);

Cooler Security
Y or N
Y or N

- | | |
|--|---|
| 1. Custody Seals Present: <input checked="" type="checkbox"/> Y <input type="checkbox"/> N | 3. COC Present: <input checked="" type="checkbox"/> Y <input type="checkbox"/> N |
| 2. Custody Seals Intact: <input checked="" type="checkbox"/> Y <input type="checkbox"/> N | 4. Smpl Dates/Time OK: <input checked="" type="checkbox"/> Y <input type="checkbox"/> N |

Cooler Temperature
Y or N

- | | |
|---|-------------------------------------|
| 1. Temp criteria achieved: <input checked="" type="checkbox"/> Y <input type="checkbox"/> N | 2. Cooler temp verification: IR Gun |
| 3. Cooler media: Ice (Bag) | 4. No. Coolers: 1 |

Quality Control Preservation
Y
N
N/A

- | | |
|---|--|
| 1. Trip Blank present / cooler: <input type="checkbox"/> Y <input checked="" type="checkbox"/> N <input type="checkbox"/> N/A | 2. Trip Blank listed on COC: <input type="checkbox"/> Y <input checked="" type="checkbox"/> N <input type="checkbox"/> N/A |
| 3. Samples preserved properly: <input type="checkbox"/> Y <input checked="" type="checkbox"/> N <input type="checkbox"/> N/A | 4. VOCs headspace free: <input type="checkbox"/> Y <input checked="" type="checkbox"/> N <input type="checkbox"/> N/A |

Sample Integrity - Documentation
Y or N

- | | |
|---|--|
| 1. Sample labels present on bottles: <input checked="" type="checkbox"/> Y <input type="checkbox"/> N | 2. Container labeling complete: <input checked="" type="checkbox"/> Y <input type="checkbox"/> N |
| 3. Sample container label / COC agree: <input checked="" type="checkbox"/> Y <input type="checkbox"/> N | |

Sample Integrity - Condition
Y or N

- | | |
|---|---|
| 1. Sample recvd within HT: <input checked="" type="checkbox"/> Y <input type="checkbox"/> N | 2. All containers accounted for: <input checked="" type="checkbox"/> Y <input type="checkbox"/> N |
| 3. Condition of sample: Intact | |

Sample Integrity - Instructions
Y
N
N/A

- | | |
|---|--|
| 1. Analysis requested is clear: <input checked="" type="checkbox"/> Y <input type="checkbox"/> N | 2. Bottles received for unspecified tests: <input type="checkbox"/> Y <input checked="" type="checkbox"/> N |
| 3. Sufficient volume recvd for analysis: <input type="checkbox"/> Y <input checked="" type="checkbox"/> N | 4. Compositing instructions clear: <input type="checkbox"/> Y <input type="checkbox"/> N <input checked="" type="checkbox"/> N/A |
| 5. Filtering instructions clear: <input type="checkbox"/> Y <input type="checkbox"/> N | |

Comments

Received HCL voa vials although TCLP Volatiles would require unpreserved volume.
 The matrix is most likely an odorous wastewater although it is listed as LIQ. Can we confirm what the matrix should be.
 -1: 1 of 3 voa vials has macrobubble; -2: 3 of 3 voa vials have macrobubbles.

JC17413: Chain of Custody

Page 2 of 3

Sample Receipt Summary - Problem Resolution

Job Number: JC17413

Initiator: timh

CSR: MV

Response Date: 4/1/2016

Response: These are already leached and submitted to us for VOC's (not TCLP VOC) To be logged in for the tests listed in the lower right section of the chain (in the comments field)

4.1
4

JC17413: Chain of Custody

Page 3 of 3

Attachment 2

Compatibility Study Results

Table A2-1. Leachate A and Leachate B Concentrations with Time
Focused Feasibility Study Results Summary: Liner Compatibility Testing
 American Cyanamid Superfund Site
 Bridgewater, New Jersey

COC:	Acetone*		Benzene*		1,2-DCB*		Naphthalene		Toluene*	
Leachate ID:	A	B	A	B	A	B	A	B	A	B
Time (days)	Concentration (µg/L)									
Prespike	926	142 J	28,900	8,700	76	75.7	198 J	193	2,680	1,170
0	2,200	552	367,000	54,500	2,120	819	1,940	1,800	43,100	11,600
10	3,042 C	552 C	507,000 C	102,395 C	2,120 C	1,010 C	2,003 C	2,011 C	50,363 C	15,179 C
30	1,650 †	330 †	130,000	27,700	95 †	18 †	100 †	20 †	4,990	1780
43	3,480 J	1090	243,000	48,200	483 J	788	382 J	2,300	14,700	6,360
60	4,220	841 J	166,000	25,100	55 J	148 J	54 J	60 J	8,690	2150
70	4,150 †	1,140 J	338,000	40,400	4,190	355	4,180 J	1,010 J	53,600	4,470
92	4,520	1,330	230,000	36,900	226 J	103	189 J	184 J	13,400	3,330
100	3,810	1,110	282,000	43,200	853	155	769 J	228 J	21,800	3,900
120	2,630 J	572 Q	275,000	48,700	323 J	180	100 †	303 J	18,900	4,930

COC:	Xylene*		Acetophenone		Total VOCs	
Leachate ID:	A	B	A	B	A	B
Time (days)	Concentration (µg/L)					
Prespike	199	117	5,250	6,600	32,781	10,205
0	2,420	1390	4,480	4,950	416,840	68,861
10	3,031 C	2,032 C	4,480 C	8,161 C	565,556	121,167
30	85 †	70.2 J	3,560	7150	136,820	29,898
43	456 J	1,050	NA	NA	262,119	57,488
60	147 J	134	4,790	6,910	179,112	28,373
70	3,960	408	NA	NA	403,900	46,773
92	295	187	NA	NA	248,441	41,850
100	797	238	NA	NA	309,260	48,603
120	85 †	273	5,470	8,070	296,938	54,655

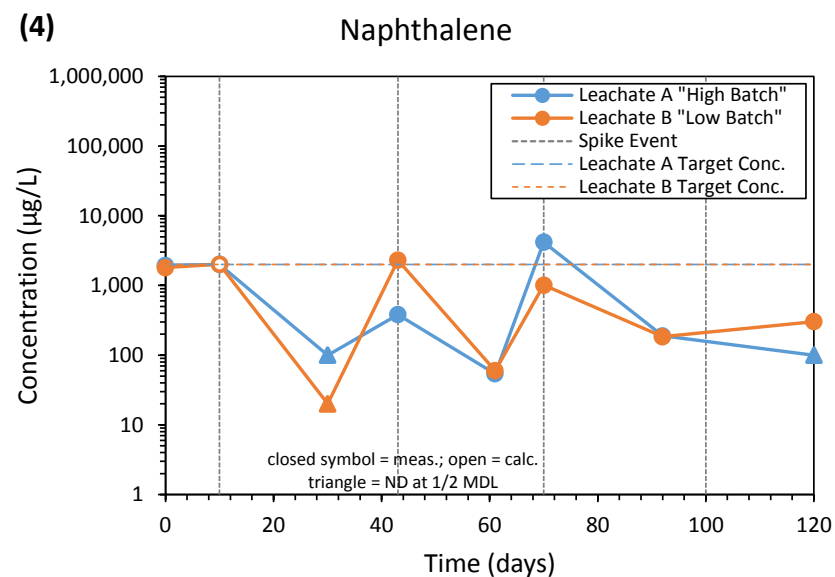
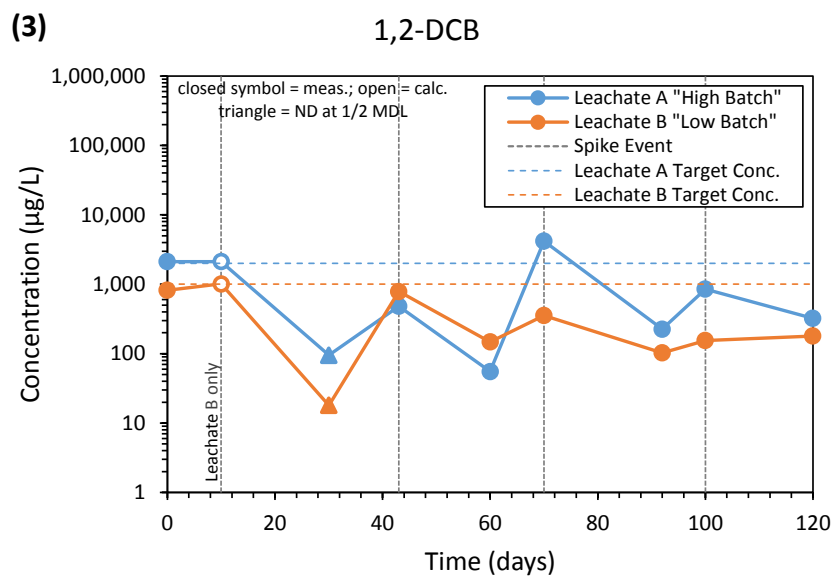
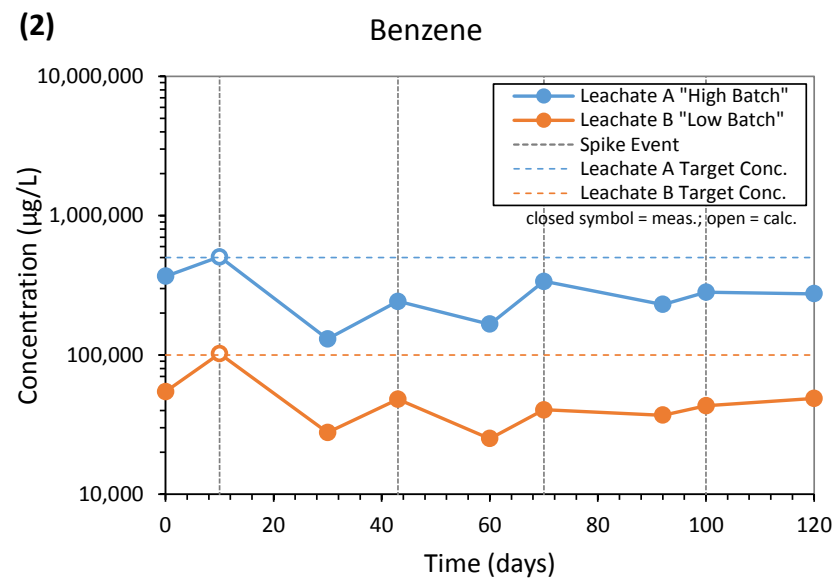
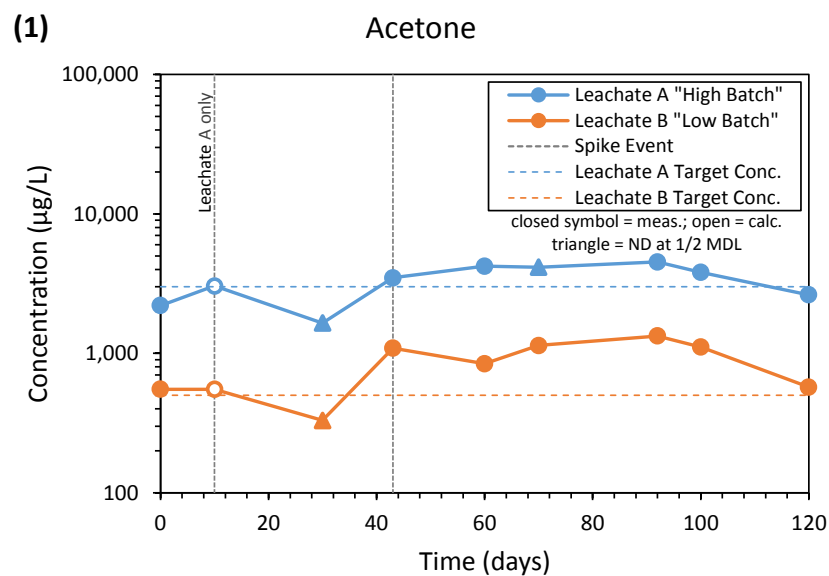
* = Included in total VOCs

C = Calculated based on spike amount

† = non-detect value reported at half the method detection limit

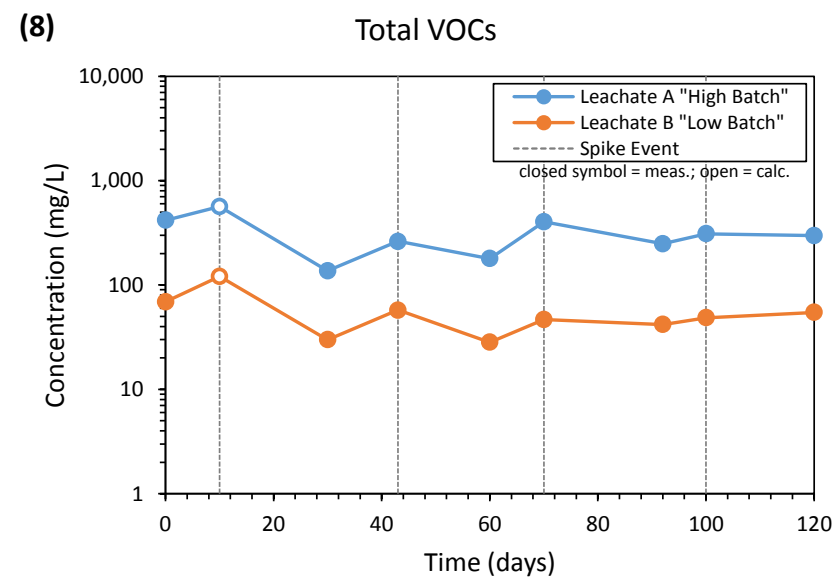
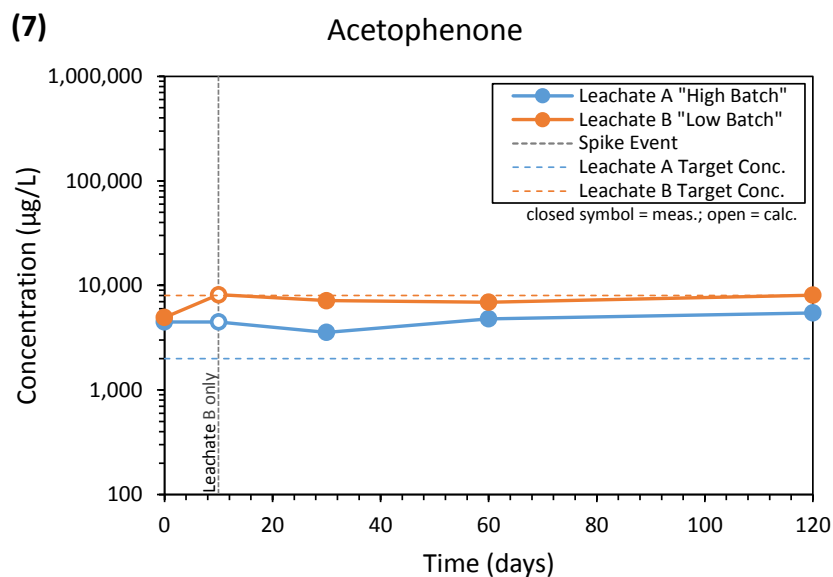
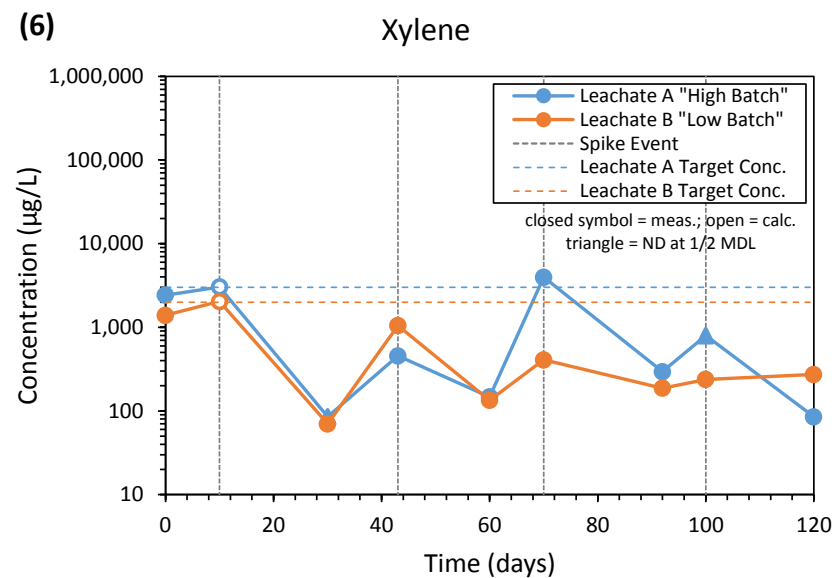
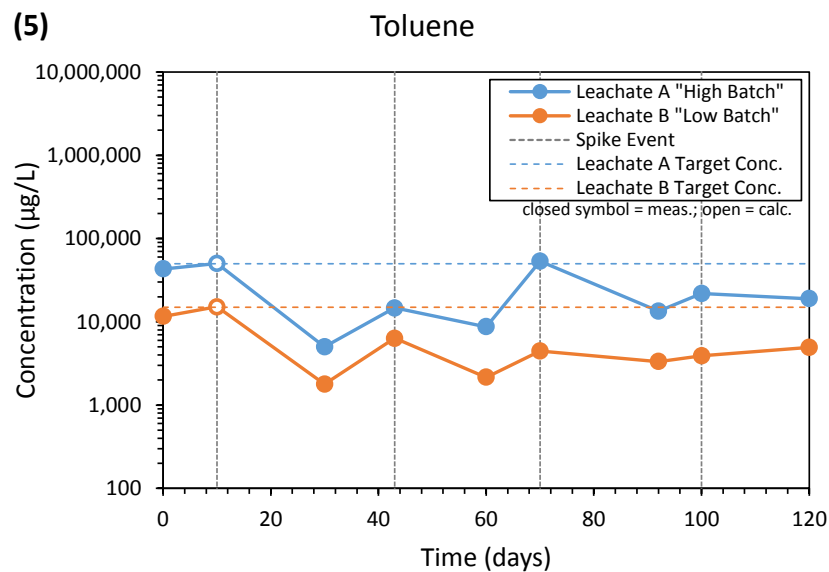
J = Estimated value below reporting limit

Q = Special qualifier: unofficial results far below detection limit



ND = not detected above reporting limit
MDL = method detection limit

Figures A2-1,2,3,4. Compatibility Study Concentration Time-series Plots
Focused Feasibility Study Results Summary: Liner Compatibility Testing
American Cyanamid Superfund Site
Bridgewater, New Jersey



ND = not detected above reporting limit
MDL = method detection limit

Figures A2-5,6,7,8. Compatibility Study Concentration Time-series Plots
Focused Feasibility Study Results Summary: Liner Compatibility Testing
American Cyanamid Superfund Site
Bridgewater, New Jersey

Attachment 3

Control Study Results

Table A3-1. Control Study Concentrations with Time

Focused Feasibility Study Results Summary: Liner Compatibility Testing

American Cyanamid Superfund Site

Bridgewater, New Jersey

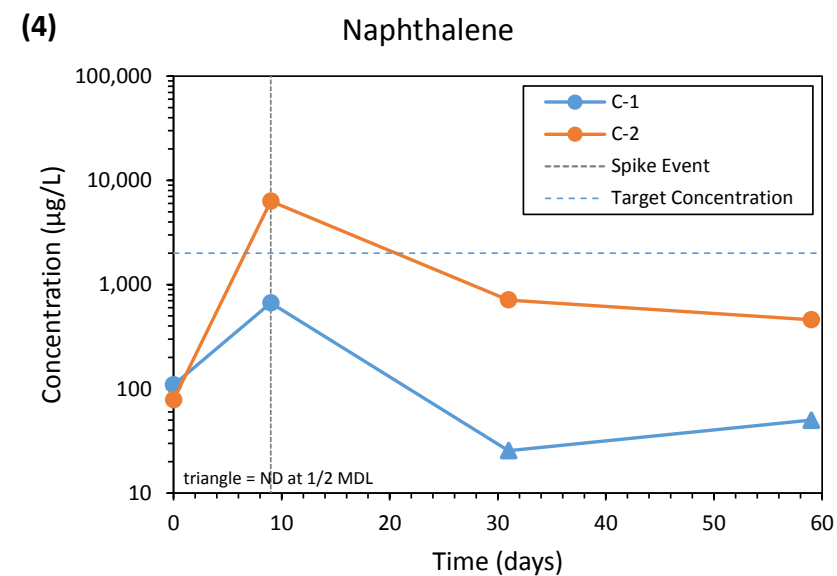
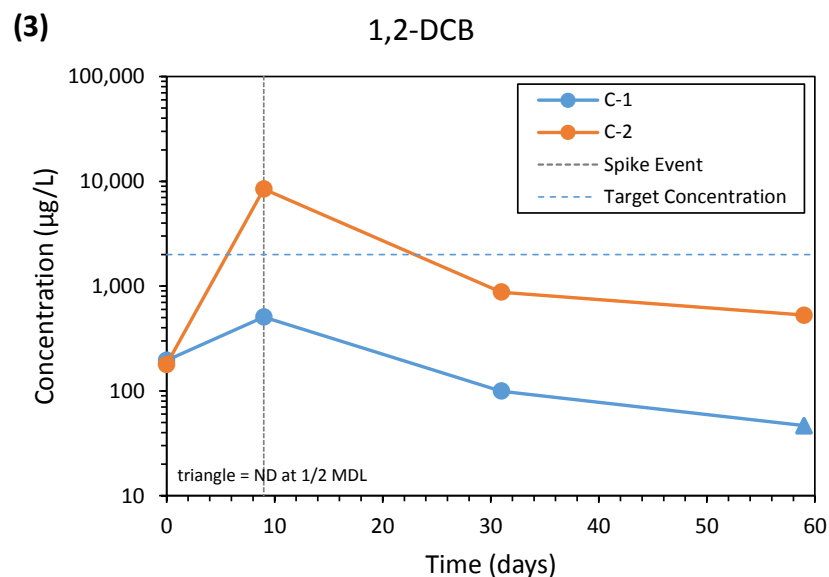
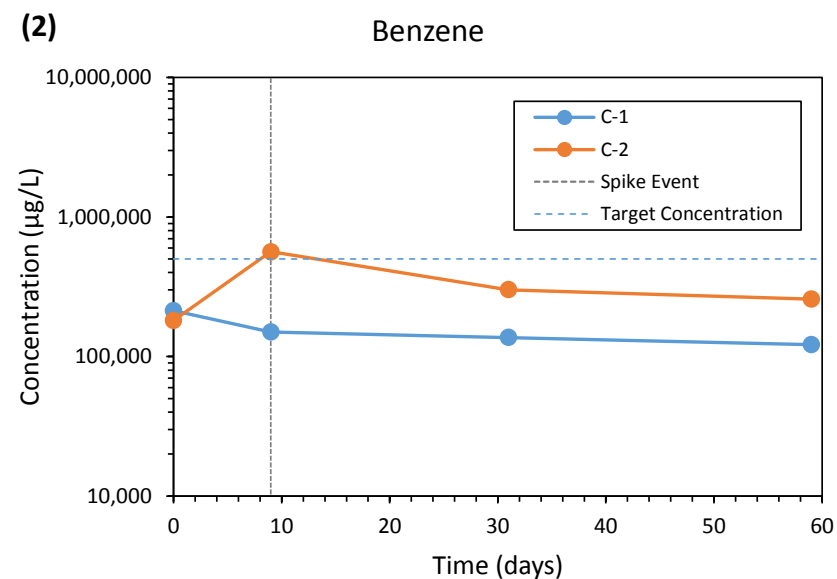
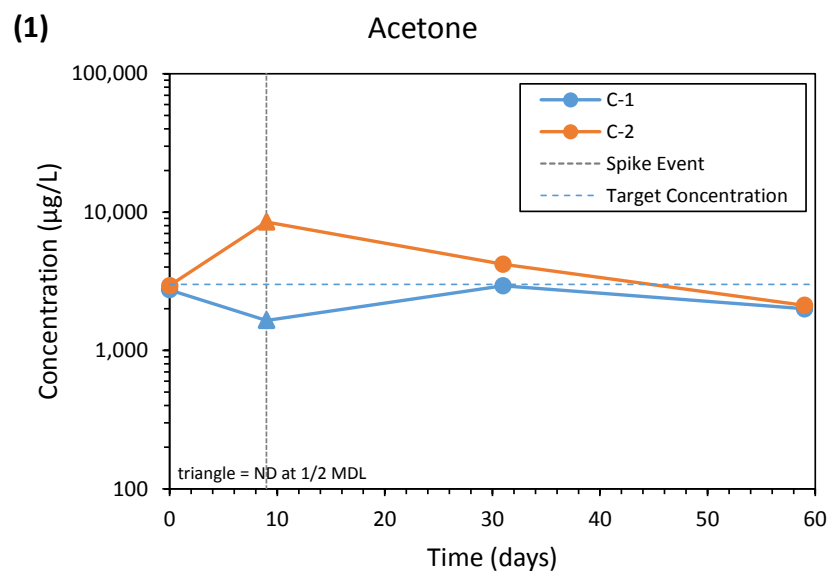
COC:	Acetone*		Benzene*		1,2-DCB*		Naphthalene		Toluene*	
Control ID:	C-1	C-2	C-1	C-2	C-1	C-2	C-1	C-2	C-1	C-2
Time (days)	Concentration (µg/L)									
0	2740 J	2940	213000	181000	196 J	179 J	109	78.4 J	12200	11200
9	1100 †	8500 †	150000	564000	508 J	8470	669 J	6330 J	8550	90400
31	2930	4190 J	137000	301000	99.2 J	875	25.5 †	712 J	5020	20800
59	2000 J	2120 Q	122000	258000	46.5 †	529	50 †	460	4340	15300

COC:	Xylene*		Total VOCs	
Control ID:	C-1	C-2	C-1	C-2
Time (days)	Concentration (µg/L)			
0	215 J	328	228351	195647
9	552 J	4400 J	161260	675770
31	20.5 †	592	145070	327457
59	41.5 †	85 †	128428	276034

* = Included in total VOCs

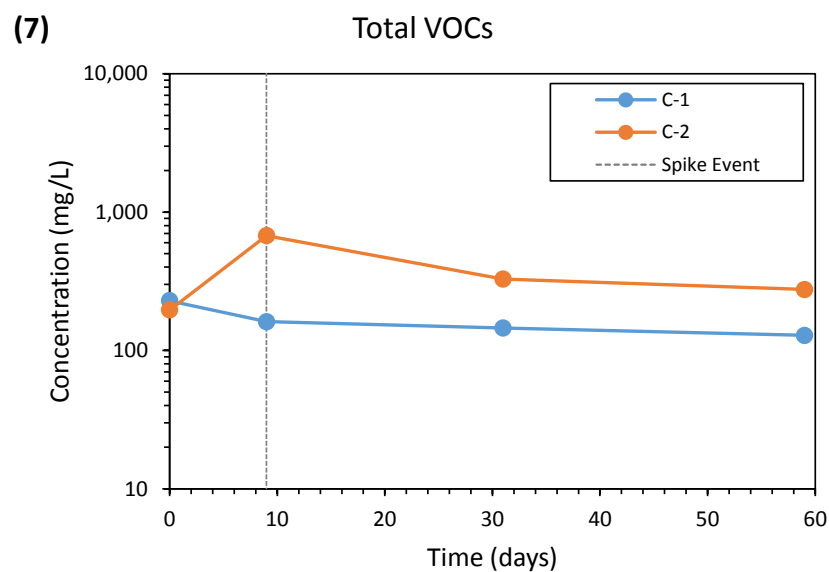
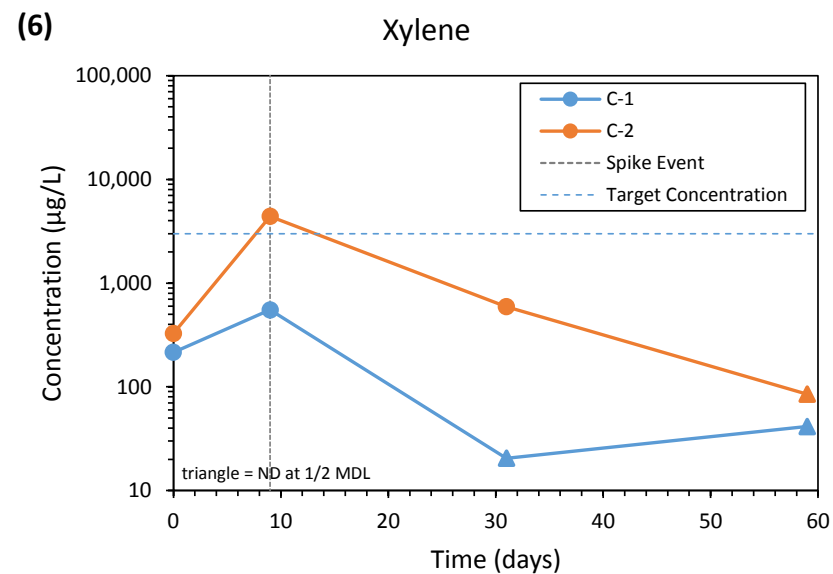
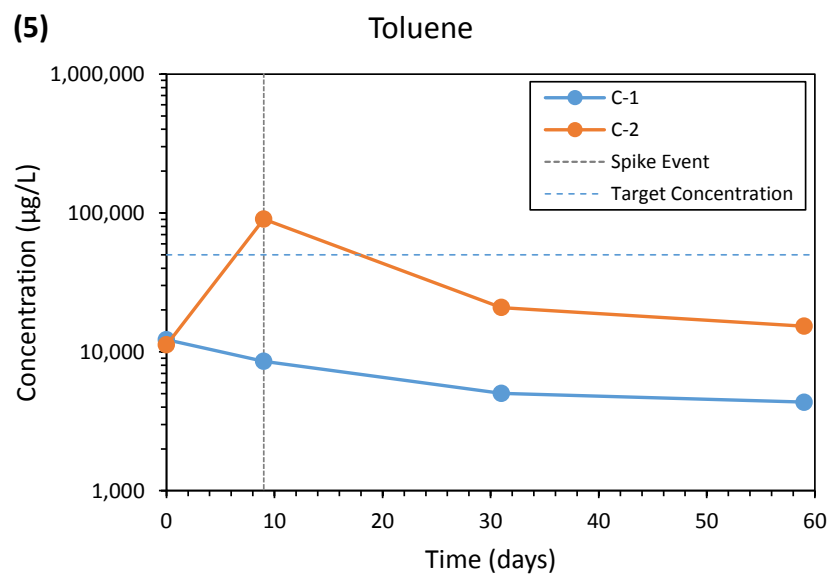
† = non-detect value reported at half the method detection limit

J = Estimated value below reporting limit



C-1 = Control 1 (with liner coupons)
 C-2 = Control 2 (without liner coupons)
 ND = not detected above reporting limit
 MDL = method detection limit

Figures A3-1,2,3,4. Control Study Concentration Time-series Plots
Focused Feasibility Study Results Summary: Liner Compatibility Testing
 American Cyanamid Superfund Site
 Bridgewater, New Jersey



C-1 = Control 1 (with liner coupons)
 C-2 = Control 2 (without liner coupons)
 ND = not detected above reporting limit
 MDL = method detection limit

Figures A3-5,6,7. Control Study Concentration Time-series Plots
Focused Feasibility Study Results Summary: Liner Compatibility Testing
 American Cyanamid Superfund Site
 Bridgewater, New Jersey

Attachment 4

Statistical (ANOVA) Evaluation

ANOVA Methodology

Temporal differences for each of the measured properties were statistically evaluated with a methodology known as analysis of variance (ANOVA). In this procedure, the total variation in the measured properties is partitioned into different potential sources of variation. In this study, the potential sources are limited to the immersion time and the random scatter of the replicate specimens for any given immersion time. When the variation due to changes in immersion time is sufficiently large, relative to the variation in the replicates, those changes are considered to be significant.

The ANOVA approach used in this evaluation is two-staged. The first stage determines whether significant differences exist in the average values for the various immersion times. The null or default hypothesis was that the average for each test property at each immersion period (including the initial average) is the same. If this null hypothesis was rejected, then the conclusion was that at least one of the means is different from the others. A nonparametric ANOVA approach based on ranks of the data (known as the Kruskal-Wallis test) was used with the results reported in Table A5-1.

A probability value was calculated, indicating the probability that the observed differences would occur if the actual responses for each immersion time were equivalent. That is, the probability that the observed differences occurred merely due to random variability in the data. Thus, a low probability suggests that the null hypothesis (that each immersion time is centered the same) be rejected, while a high probability suggests that there is no significant difference between the average response across different immersion times.

When a significant difference was determined to exist between the measured response means of the immersion times, this initial testing was followed up with a *post hoc* test, using Tukey multiple comparison technique, to determine which immersion times were different from one another and which were the same. The results from this *post hoc* test are shown as alphabetic characters. For instance, if each category is listed as an "A," then none of the categories were significantly different from one another. If a statistically significant difference does exist, then at least one of the categories is listed as a "B," and other possibly as "C," "D", etc. (By convention, the highest response average are always associated with the "A" category, while the lower averages are provided subsequent alphabetic characters.) It is, of course, possible for the average concentration of a category to fall between two other statistically significant categories, where the intermediate category is not statistically different from either of the other two. In this case, one category would be listed as an 'A', one as a 'B', and the intermediate category as an "AB."

A review of this ANOVA output identified a number of statistical differences between events for the majority of properties. Identifying such differences, however, does not indicate that leachates are imposing deterioration unless a consistent worsening pattern appears. Alternate increases and decreases in a property's measured values represent variability that is due to some unexplained factors besides temporal values (30 days, 60 days, etc.). A review of the differences identified by ANOVA did not identify patterns of increase or decrease in material properties with exposure time for coupons exposed to either Leachate A or Leachate B.

Table 1: ANOVA Results from Comparison Between Events

Property	Description	Leachate	Calculated Probability *	Event Decision	Tukey Post Hoc Groupings				
					Initial	30 Days	60 Days	90 Days	120 Days
Density		A	0.009	Statistical Difference	AB	B	AB	A	B
Density		B	0.001	Statistical Difference	A	AB	A	A	B
Elongation @ Break (%)	Machine Direction	A	0.079		-	-	-	-	-
Elongation @ Break (%)	Machine Direction	B	0.939		-	-	-	-	-
Elongation @ Break (%)	Transverse Direction	A	0.286		-	-	-	-	-
Elongation @ Break (%)	Transverse Direction	B	0.228		-	-	-	-	-
Elongation @ Yield (%)	Machine Direction	A	0.003	Statistical Difference	B	A	A	A	AB
Elongation @ Yield (%)	Machine Direction	B	0.000	Statistical Difference	B	A	A	A	A
Elongation @ Yield (%)	Transverse Direction	A	0.028	Statistical Difference	AB	AB	AB	B	A
Elongation @ Yield (%)	Transverse Direction	B	0.000	Statistical Difference	A	B	AB	B	B
Hydrostatic Resistance (psi)		A	0.000	Statistical Difference	B	A	B	A	B
Hydrostatic Resistance (psi)		B	0.000	Statistical Difference	C	A	AB	A	B
Indentation Hardness		A	0.002	Statistical Difference	A	A	B	AB	A
Indentation Hardness		B	0.261		-	-	-	-	-
Load @ Rupture (lbs)	Puncture Resistance	A	0.000	Statistical Difference	AB	AB	BC	A	C
Load @ Rupture (lbs)	Puncture Resistance	B	0.004	Statistical Difference	AB	A	B	A	AB
Modulus of Elasticity	Machine Direction	A	0.070		-	-	-	-	-
Modulus of Elasticity	Machine Direction	B	0.001	Statistical Difference	AB	A	B	AB	A
Modulus of Elasticity	Transverse Direction	A	0.000	Statistical Difference	BC	A	C	AB	C
Modulus of Elasticity	Transverse Direction	B	0.001	Statistical Difference	B	A	B	AB	AB
Set after Break (%)	Machine Direction	A	0.028	Statistical Difference	A	A	A	A	A
Set after Break (%)	Machine Direction	B	0.005	Statistical Difference	A	B	A	AB	AB
Set after Break (%)	Transverse Direction	A	0.017	Statistical Difference	B	B	B	A	B
Set after Break (%)	Transverse Direction	B	0.711		-	-	-	-	-
Stress @ 100% Elongation (psi)	Machine Direction	A	0.006	Statistical Difference	B	B	B	A	B
Stress @ 100% Elongation (psi)	Machine Direction	B	0.000	Statistical Difference	C	A	BC	AB	AB
Stress @ 100% Elongation (psi)	Transverse Direction	A	0.163		-	-	-	-	-
Stress @ 100% Elongation (psi)	Transverse Direction	B	0.087		-	-	-	-	-
Stress @ 200% Elongation (psi)	Machine Direction	A	0.007	Statistical Difference	B	B	B	A	B
Stress @ 200% Elongation (psi)	Machine Direction	B	0.000	Statistical Difference	B	A	AB	A	A
Stress @ 200% Elongation (psi)	Transverse Direction	A	0.299		-	-	-	-	-
Stress @ 200% Elongation (psi)	Transverse Direction	B	0.280		-	-	-	-	-
Tear Resistance (lbs)	Machine Direction	A	0.059		-	-	-	-	-
Tear Resistance (lbs)	Machine Direction	B	0.000	Statistical Difference	C	B	BC	A	B
Tear Resistance (lbs)	Transverse Direction	A	0.000	Statistical Difference	B	B	B	A	A
Tear Resistance (lbs)	Transverse Direction	B	0.005	Statistical Difference	B	A	AB	A	A

Tensile Strength @ Break (psi)	Machine Direction	A	0.398		-	-	-	-	-
Tensile Strength @ Break (psi)	Machine Direction	B	0.000	Statistical Difference	B	A	AB	A	A
Tensile Strength @ Break (psi)	Transverse Direction	A	0.259		-	-	-	-	-
Tensile Strength @ Break (psi)	Transverse Direction	B	0.386		-	-	-	-	-
Tensile Stress @ Yield (psi)	Machine Direction	A	0.094		-	-	-	-	-
Tensile Stress @ Yield (psi)	Machine Direction	B	0.042	Statistical Difference	A	A	A	A	A
Tensile Stress @ Yield (psi)	Transverse Direction	A	0.026	Statistical Difference	A	A	A	A	A
Tensile Stress @ Yield (psi)	Transverse Direction	B	0.002	Statistical Difference	B	A	B	AB	A
% Extractables	Volatiles and Extractables **	A	0.003	Statistical Difference	BC	C	ABC	AB	A
% Extractables	Volatiles and Extractables **	B	0.028	Statistical Difference	B	AB	AB	AB	A
% Volatiles	Volatiles and Extractables **	A	0.000	Statistical Difference	D	BC	AB	DC	A
% Volatiles	Volatiles and Extractables **	B	0.000	Statistical Difference	D	AB	BC	DC	A
Machine Diameter Change (%)	Volatiles and Extractables **	A	0.057		-	-	-	-	-
Machine Diameter Change (%)	Volatiles and Extractables **	B	0.042	Statistical Difference	A	A	A	A	A
Transverse Diameter Change (%)	Volatiles and Extractables **	A	0.347		-	-	-	-	-
Transverse Diameter Change (%)	Volatiles and Extractables **	B	0.589		-	-	-	-	-

Notes:

* ANOVA probability that significant shifts between events do not exist (reject if probability < 0.05)

** The volatile and extractable evaluations included only two analyses per leachate, so statistical conclusions are not as well supported as the other properties.

Attachment 5

TRI Laboratory Reports

GEOMEMBRANE TEST RESULTS
TABLE OF CHEMICAL COMPATIBILITY TEST RESULTS
 TRI Client: CH2MHill
 Chemical: Leachate A

Report Date: April 2016

Exposure Time and Temperature

Test Parameters	Temp.	30 Day			60 Day			90 Day			120 Day		
		Baseline	Exposed	% Change	Baseline	Exposed	% Change	Baseline	Exposed	% Change	Baseline	Exposed	% Change

60 mil textured HDPE geomembrane: Roll # G15F334051

Thickness (mils)	23C	61.2	61.0	-0.2	60.7	60.4	-0.5	60.7	60.9	0.3	61.8	60.7	-1.7
Length (inches)	23C	10.07	10.03	-0.40	10.01	10.02	0.19	10.00	10.02	0.20	10.00	10.03	0.28
Width (inches)	23C	8.02	8.03	0.15	8.02	8.04	0.16	8.02	8.03	0.16	8.02	8.04	0.21
Mass (g)	23C	78.44	78.68	0.31	72.36	72.78	0.58	73.11	73.46	0.48	74.24	74.66	0.57

GEOMEMBRANE TEST RESULTS
TABLE OF CHEMICAL COMPATIBILITY TEST RESULTS
 TRI Client: CH2MHill
 Chemical: Leachate B

Report Date: April 2016

Exposure Time and Temperature

Test Parameters	Temp.	30 Day			60 Day			90 Day			120 Day		
		Baseline	Exposed	% Change	Baseline	Exposed	% Change	Baseline	Exposed	% Change	Baseline	Exposed	% Change

60 mil textured HDPE geomembrane: Roll # G15F334051

Thickness (mils)	23C	61.2	61.0	-0.2	60.9	60.4	-0.7	61.8	61.3	-0.7	60.7	61.4	1.2
Length (inches)	23C	10.00	10.01	0.04	10.01	10.01	0.08	10.00	10.01	0.07	10.00	10.02	0.19
Width (inches)	23C	8.03	8.03	0.07	8.02	8.03	0.09	8.02	8.03	0.09	8.03	8.03	0.01
Mass (g)	23C	79.60	79.70	0.13	74.80	74.90	0.13	80.44	80.54	0.12	79.52	79.77	0.31



GEOMEMBRANE TEST RESULTS TABLE OF CHEMICAL COMPATIBILITY TEST RESULTS

TRI Client: CH2MHill
Chemical: Leachate A and B

Report Date: April 2016

Exposure Time and Temperature
23C

Test Parameters	Baseline Leachate	30 Day		60 Day		90 Day		120 Day	
		A	B	A	B	A	B	A	B
60 mil textured HDPE geomembrane: Roll # G15F334051									
Tensile Properties:									
Tensile Stress @ Yield (psi)	2546	2359	2476	2348	2388	2502	2455	2349	2446
ASTM D638	2610	2463	2528	2323	2367	2473	2400	2368	2528
Machine Direction	2464	2375	2513	2120	2446	2504	2483	2423	2511
	2388	2418	2501	2432	2457	2332	2442	2517	2585
	2476	2465	2475	2434	2479	2457	2425	2587	2515
	2438								
Average	2487	2416	2499	2331	2427	2454	2441	2449	2517
STD	79	49	23	128	48	71	31	101	50
Coefficient of Variation	3	2	1	5	2	3	1	4	2
% Change		-3	0	-6	-2	-1	-2	-2	1
Tensile Strength @ Break (psi)	3238	3510	3903	2906	3269	3710	3695	3209	3906
ASTM D638	3207	3174	3734	2712	3457	3675	3848	2730	3821
Machine Direction	2817	2863	3398	3108	3639	3687	3837	2960	3551
	2777	2949	3959	3695	3510	2026	3821	3174	3365
	2975	3525	3893	3665	3684	3665	3779	2970	3418
	2892								
Average	2984	3204	3777	3217	3512	3353	3796	3009	3612
STD	197	308	228	445	164	742	62	193	241
Coefficient of Variation	7	10	6	14	5	22	2	6	7
% Change		7	27	8	18	12	27	1	21
Elongation @ Yield (%)	17.1	17.9	20.8	16.5	19.3	20.1	20.6	17.4	19.8
ASTM D638	16.4	18.9	19.5	17.2	18.1	20.6	20.2	17.1	20.1
Machine Direction	16.1	17.7	17.9	19.6	18.8	20.8	20.5	18.3	18.8
	15.4	17.1	20.3	20.9	20.0	16.3	20.9	17.6	17.6
	16.8	18.6	21.1	19.6	19.0	19.6	19.2	17.1	18.7
	15.3								
Average	16.2	18.0	19.9	18.8	19.0	19.5	20.3	17.5	19.0
STD	0.7	0.7	1.3	1.8	0.7	1.8	0.7	0.5	1.0
Coefficient of Variation	4.5	4.0	6.4	9.8	3.7	9.4	3.2	2.8	5.2
% Change		11.5	23.1	15.9	17.7	20.4	25.3	8.1	17.4



GEOMEMBRANE TEST RESULTS TABLE OF CHEMICAL COMPATIBILITY TEST RESULTS

TRI Client: CH2MHill
Chemical: Leachate A and B

Report Date: April 2016

Exposure Time and Temperature
23C

Test Parameters	Baseline Leachate	30 Day		60 Day		90 Day		120 Day	
		A	B	A	B	A	B	A	B

60 mil textured HDPE geomembrane: Roll # G15F334051

Tensile Properties:

Elongation @ Break (%)	506	476	463	510	423	465	464	514	484
ASTM D638	489	464	464	478	481	450	470	455	470
Machine Direction	459	464	438	458	511	453	454	480	463
	445	480	471	453	464	336	468	503	414
	453	479	460	471	463	454	450	486	459
	490								

Average	474	473	459	474	468	432	461	488	458
STD	25	8	13	23	32	54	9	23	26
Coefficient of Variation	5	2	3	5	7	12	2	5	6

% Change		0	-3	0	-1	-9	-3	3	-3
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Set after Break (%)	520	450	450	500	550	450	470	500	450
ASTM D638	500	430	450	500	500	450	540	450	430
Machine Direction	460	460	430	480	500	450	450	400	460
	460	450	450	400	480	430	550	500	420
	480	450	450	500	450	410	450	480	460
	490								

Average	485	448	446	476	496	438	492	466	444
STD	23	11	9	43	36	18	49	42	18
Coefficient of Variation	5	2	2	9	7	4	10	9	4

% Change		-8	-8	-2	2	-10	1	-4	-8
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Stress @ 100% Elongation (psi)	2064	2185	2391	1933	2162	2298	2292	1995	2351
ASTM D638	2159	2084	2310	1956	2141	2295	2258	1978	2348
Machine Direction	2061	1973	2243	1970	2137	2359	2354	2043	2227
	1933	2017	2377	2271	2181	2895	2354	2120	2334
	2092	2178	2313	2268	2325	2293	2268	2098	2162
	2017								

Average	2054	2087	2327	2080	2189	2428	2305	2047	2284
STD	76	95	59	174	78	263	46	62	85
Coefficient of Variation	4	5	3	8	4	11	2	3	4

% Change		2	13	1	7	18	12	0	11
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GEOMEMBRANE TEST RESULTS

TABLE OF CHEMICAL COMPATIBILITY TEST RESULTS

TRI Client: CH2MHill
Chemical: Leachate A and B

Report Date: April 2016

Exposure Time and Temperature
23C

Test Parameters	Baseline	30 Day		60 Day		90 Day		120 Day	
	Leachate	A	B	A	B	A	B	A	B
60 mil textured HDPE geomembrane: Roll # G15F334051									
Tensile Properties:									
Stress @ 200% Elongation (psi)	2033	2197	2420	2005	2253	2315	2302	2057	2404
ASTM D638	2208	2117	2341	2024	2281	2329	2277	2006	2385
Machine Direction	2134	2063	2332	2004	2180	2385	2413	2129	2349
	2084	2079	2458	2316	2212	2948	2389	2126	2382
	2126	2275	2328	2305	2378	2358	2315	2114	2243
	2030								
Average	2103	2146	2376	2131	2261	2467	2339	2086	2353
STD	68	89	59	164	76	270	59	54	64
Coefficient of Variation	3	4	3	8	3	11	3	3	3
% Change		2	13	1	8	17	11	-1	12
Tensile Stress @ Yield (psi)	2530	2682	2635	2555	2723	2563	2727	2594	2707
ASTM D638	2638	2656	2631	2590	2376	2631	2713	2555	2821
Transverse Direction	2576	2569	2857	2547	2612	2564	2685	2506	2799
	2648	2568	2821	2417	2422	2580	2725	2513	2750
	2623	2592	2759	2462	2577	2617	2557	2471	2730
	2552								
Average	2595	2613	2741	2514	2542	2591	2681	2528	2761
STD	49	52	104	72	142	31	72	48	48
Coefficient of Variation	2	2	4	3	6	1	3	2	2
% Change		1	6	-3	-2	0	3	-3	6
Tensile Strength @ Break (psi)	2738	3130	2841	3197	3339	3296	3111	3016	3164
ASTM D638	3382	3055	3277	3081	2936	2804	3262	1999	3518
Transverse Direction	2796	2786	3017	2898	3180	2979	3156	2901	3538
	2673	3242	2717	2480	3408	3001	1869	2977	1915
	2756	3499	3238	2920	3099	3110	3182	3067	3143
	2823								
Average	2861	3142	3018	2915	3192	3038	2916	2792	3056
STD	260	261	244	272	189	181	588	447	665
Coefficient of Variation	9	8	8	9	6	6	20	16	22
% Change		10	5	2	12	6	2	-2	7



GEOMEMBRANE TEST RESULTS TABLE OF CHEMICAL COMPATIBILITY TEST RESULTS

TRI Client: CH2MHill
Chemical: Leachate A and B

Report Date: April 2016

Exposure Time and Temperature
23C

Test Parameters	Baseline	30 Day		60 Day		90 Day		120 Day	
	Leachate	A	B	A	B	A	B	A	B
60 mil textured HDPE geomembrane: Roll # G15F334051									
Tensile Properties:									
Elongation @ Yield (%)	13.9	14.4	12.9	12.8	13.6	13.4	12.2	14.1	13.1
ASTM D638	14.1	13.9	12.4	13.4	13.2	12.5	12.0	14.7	12.2
Transverse Direction	13.4	14.2	12.1	13.0	12.2	13.2	12.7	14.6	12.0
	13.5	13.1	12.9	15.2	13.7	14.0	12.6	14.3	12.5
	15.0	13.9	12.9	14.0	14.2	13.5	12.7	15.8	12.4
	14.1								
Average	14.0	13.9	12.6	13.7	13.4	13.3	12.4	14.7	12.4
STD	1	0.5	0.4	1.0	0.7	0.5	0.3	0.7	0.4
Coefficient of Variation	4	3.6	2.9	7.1	5.6	4.1	2.6	4.5	3.3
% Change		-0.7	-9.7	-2.3	-4.4	-4.9	-11.1	5.0	-11.1
Elongation @ Break (%)	533	580	546	595	610	618	609	565	595
ASTM D638	610	589	603	610	578	549	613	353	625
Transverse Direction	516	509	573	566	626	563	585	568	639
	501	611	481	456	650	578	351	563	238
	498	641	615	595	586	580	595	585	566
	564								
Average	537	586	564	565	610	577	551	527	533
STD	43	49	53	63	30	26	112	98	167
Coefficient of Variation	8	8	9	11	5	4	20	19	31
% Change		9	5	5	14	8	3	-2	-1
Set after Break (%)	550	550	550	600	600	650	600	580	620
ASTM D638	620	580	600	600	600	600	620	450	610
Transverse Direction	560	530	600	580	650	625	600	590	630
	570	600	470	500	600	675	425	580	390
	510	580	600	550	550	620	600	550	590
	600								
Average	568	568	564	566	600	634	569	550	568
STD	39	28	57	42	35	29	81	58	101
Coefficient of Variation	7	5	10	7	6	5	14	11	18
% Change		0	-1	0	6	12	0	-3	0



GEOMEMBRANE TEST RESULTS **TABLE OF CHEMICAL COMPATIBILITY TEST RESULTS**

TRI Client: CH2MHill
 Chemical: Leachate A and B

Report Date: April 2016

Exposure Time and Temperature
 23C

Test Parameters	Baseline Leachate	30 Day		60 Day		90 Day		120 Day	
		A	B	A	B	A	B	A	B

60 mil textured HDPE geomembrane: Roll # G15F334051

Tensile Properties:

Stress @ 100% Elongation (psi)	1839	1899	1871	1949	2018	1832	1910	1828	2065
ASTM D638	1902	1791	1807	1845	1745	1800	1949	1837	1986
Transverse Direction	1908	1814	1928	1882	1895	1881	1893	1814	1976
	1869	1838	1998	1809	1707	1830	1854	1817	1925
	1939	1914	1915	1799	1817	1863	1795	1818	1928
	1861								
Average	1886	1851	1904	1857	1836	1841	1880	1823	1976
STD	37	53	71	61	124	31	59	10	57
Coefficient of Variation	2	3	4	3	7	2	3	1	3
% Change		-2	1	-2	-3	-2	0	-3	5

Stress @ 200% Elongation (psi)	1933	1981	1806	1913	2006	1950	1955	1928	2041
ASTM D638	1917	1905	1870	1944	1853	1917	1842	1889	2033
Transverse Direction	1946	1800	1946	1898	1933	1988	1963	1892	2120
	1903	1922	2020	1824	1864	1905	1899	1854	1898
	1935	1964	1845	1807	1892	1901	1844	1871	1937
	1810								
Average	1907	1914	1897	1877	1910	1932	1901	1887	2006
STD	50	71	86	59	62	37	58	28	89
Coefficient of Variation	3	4	5	3	3	2	3	1	4
% Change		0	-1	-2	0	1	0	-1	5

Modulus of Elasticity:

ASTM D882 (psi)	51239	45770	54321	45839	51137	52733	56044	51183	58246
Machine Direction	51677	50934	55359	45530	49367	56137	50948	54720	54719
2% Secant	53349	48791	53561	46809	50608	52168	53706	42585	52598
	49760	55021	57566	48360	51084	50663	51645	51543	53681
	55196	56142	57874	49454	49735	48952	51142	51847	53495
	52610								
Average	52305	51332	55736	47198	50386	52131	52697	50376	54548
STD	1873	4310	1923	1675	800	2677	2168	4576	2200
Coefficient of Variation	4	8	3	4	2	5	4	9	4
% Change		-2	7	-10	-4	0	1	-4	4



GEOMEMBRANE TEST RESULTS

TABLE OF CHEMICAL COMPATIBILITY TEST RESULTS

TRI Client: CH2MHill
Chemical: Leachate A and B

Report Date: April 2016

Exposure Time and Temperature
23C

Test Parameters	Baseline	30 Day		60 Day		90 Day		120 Day	
	Leachate	A	B	A	B	A	B	A	B
60 mil textured HDPE geomembrane: Roll # G15F334051									
Modulus of Elasticity:									
ASTM D882 (psi)	55753	63000	63096	50581	54145	62712	63885	53571	62994
Transverse Direction	58153	61666	66542	57982	57360	65564	64517	57609	68108
2% Secant	59375	61457	64193	52203	57849	60114	58601	55008	64539
	59522	67124	69097	52588	55795	56368	61259	58614	64672
	54224	64335	72651	58037	60334	60811	63676	53567	50443
	57070								
Average	57350	63516	67116	54278	57097	61114	62388	55674	62151
STD	2091	2325	3860	3489	2320	3390	2452	2329	6807
Coefficient of Variation	4	4	6	6	4	6	4	4	11
% Change		11	17	-5	0	7	9	-3	8
Indentation Hardness:									
Reading	43	44	43	42	43	44	43	46	44
ASTM D2240	45	45	43	41	46	43	44	44	42
(with TYPE D DUROMETER)	44	46	46	43	42	44	44	45	45
	47	46	43	44	43	44	43	44	46
	48	47	46	42	44	44	44	45	47
	48								
Average	46	46	44	42	44	44	44	45	45
STD	2	1	2	1	2	0	1	1	2
Coefficient of Variation	5	3	4	3	3	1	1	2	4
% Change		-1	-4	-7	-5	-4	-5	-2	-2
Density:									
ASTM D1505	0.944	0.944	0.943	0.944	0.944	0.944	0.944	0.943	0.944
	0.944	0.943	0.943	0.944	0.944	0.944	0.944	0.943	0.943
	0.944	0.943	0.944	0.944	0.944	0.945	0.944	0.943	0.943
	0.944	0.944	0.944	0.944	0.944	0.945	0.944	0.944	0.943
	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.943
	0.944								
Average	0.944	0.944	0.944	0.944	0.944	0.944	0.944	0.943	0.943
STD	0.000	0.001	0.001	0.000	0.000	0.001	0.000	0.001	0.000
Coefficient of Variation	0.000	0.058	0.058	0.000	0.000	0.058	0.000	0.058	0.047
% Change		-0.042	-0.042	0.000	0.000	0.042	0.000	-0.064	-0.085



GEOMEMBRANE TEST RESULTS TABLE OF CHEMICAL COMPATIBILITY TEST RESULTS

TRI Client: CH2MHill
Chemical: Leachate A and B

Report Date: April 2016

Exposure Time and Temperature
23C

Test Parameters	Baseline Leachate	30 Day		60 Day		90 Day		120 Day	
		A	B	A	B	A	B	A	B

60 mil textured HDPE geomembrane: Roll # G15F334051

Puncture Resistance:

Load @ Rupture (lbs)	130	131	136	131	129	140	136	120	131
ASTM D4833	135	132	130	128	127	138	138	118	131
	139	128	128	128	127	139	137	120	130
	131	139	138	127	129	136	139	120	135
	132	134	140	127	129	134	136	122	135
	125								
Average	132	133	134	128	128	137	137	120	132
STD	5	4	5	2	1	2	1	1	2
Coefficient of Variation	4	3	4	1	1	2	1	1	2
% Change		1	2	-3	-3	4	4	-9	0

Tear Resistance:

ASTM D1004	53	54	59	52	57	60	63	52	59
(lbs)	51	56	56	51	57	58	62	55	56
Machine Direction	53	52	58	46	58	60	62	51	58
	52	51	59	45	54	49	65	53	58
	50	57	58	53	52	59	63	53	57
	53								
Average	52	54	58	49	56	57	63	53	58
STD	1	3	1	4	3	5	1	1	1
Coefficient of Variation	2	5	2	7	5	8	2	3	2
% Change		4	12	-5	7	10	21	2	11

Tear Resistance:

ASTM D1004	49	51	53	49	51	51	58	52	51
(lbs)	49	51	53	47	53	58	52	56	57
Transverse Direction	52	49	52	49	50	52	53	55	57
	47	51	54	49	47	56	52	57	54
	48	51	52	46	50	54	52	54	49
	48								
Average	49	51	53	48	50	54	53	55	54
STD	2	1	1	1	2	3	3	2	4
Coefficient of Variation	4	2	2	3	4	5	5	4	7
% Change		4	8	-2	3	11	9	12	10



GEOMEMBRANE TEST RESULTS **TABLE OF CHEMICAL COMPATIBILITY TEST RESULTS**

TRI Client: CH2MHill
 Chemical: Leachate A and B

Report Date: April 2016

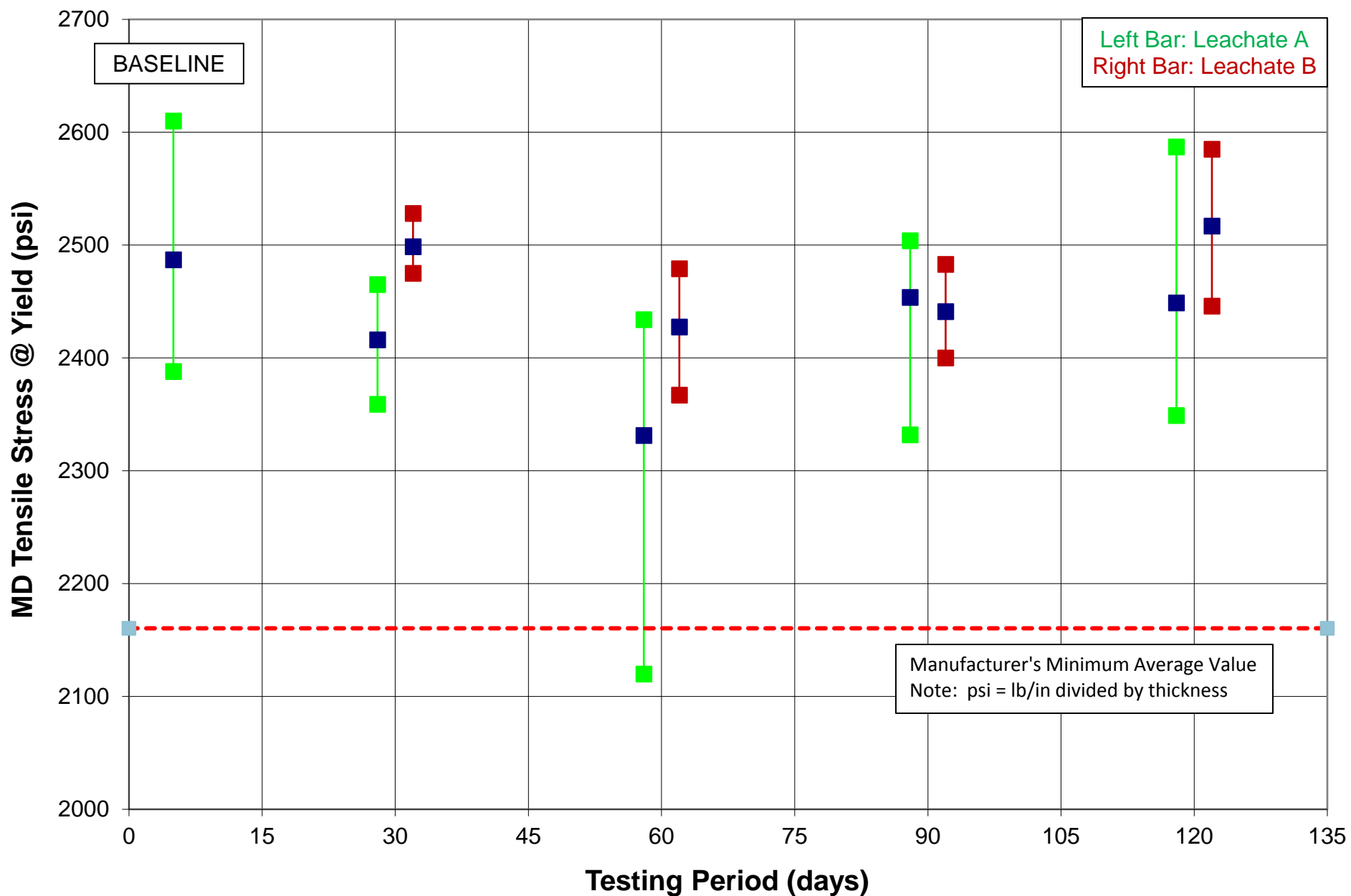
Exposure Time and Temperature
 23C

Test Parameters	Baseline Leachate	30 Day		60 Day		90 Day		120 Day	
		A	B	A	B	A	B	A	B
60 mil textured HDPE geomembrane: Roll # G15F334051									
Hydrostatic Resistance:									
ASTM D751	435	440	480	430	465	465	485	430	480
(psi)	445	455	475	430	460	465	470	430	450
	430	450	470	425	465	470	470	440	450
	430	455	480	435	465	465	470	430	440
	425	460	465	435	470	460	475	450	460
	410								
Average	429	452	474	431	465	465	474	436	456
STD	12	8	7	4	4	4	7	9	15
Coefficient of Variation	3	2	1	1	1	1	1	2	3
% Change		5	10	0	8	8	10	2	6
Volatiles and Extractables:									
Machine Diameter Change (%)	-0.80	-1.63	-1.75	-0.88	-1.88	-1.00	-2.43	-1.13	-1.00
SW 870 - Appendix III-D	-0.65	-0.75	-1.95	-0.97	-0.58	-1.42	-2.06	-1.79	-1.79
	-0.20								
	-0.75								
Average	-0.60	-1.19	-1.85	-0.93	-1.23	-1.21	-2.25	-1.46	-1.40
STD	0.27	0.62	0.14	0.06	0.92	0.30	0.26	0.47	0.56
Transverse Diameter Change (%)	-0.32	-0.07	-0.22	-0.13	-0.20	-0.87	0.10	-0.38	-0.30
SW 870 - Appendix III-D	-0.27	-0.53	-0.13	-0.47	-0.85	-0.80	-0.25	-0.30	-0.08
	-0.55								
	-0.20								
Average	-0.34	-0.30	-0.18	-0.30	-0.53	-0.84	-0.08	-0.34	-0.19
STD	0.15	0.33	0.06	0.24	0.46	0.05	0.25	0.06	0.16
% Volatiles	0.06	0.36	0.15	0.38	0.11	0.23	0.10	0.43	0.20
SW 870 - Appendix III-D	0.05	0.36	0.13	0.39	0.13	0.25	0.10	0.45	0.23
	0.08								
	0.06								
Average	0.06	0.36	0.14	0.39	0.12	0.24	0.10	0.44	0.22
STD	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.02
% Extractables	0.11	0.10	0.20	0.23	0.12	0.20	0.22	0.27	0.34
SW 870 - Appendix III-D	0.10	0.11	0.11	0.19	0.18	0.23	0.19	0.32	0.27
	0.13								
	0.11								
Average	0.11	0.11	0.16	0.21	0.15	0.22	0.21	0.30	0.31
STD	0.01	0.01	0.06	0.03	0.04	0.02	0.02	0.04	0.05



CH2MHill, Figure 1

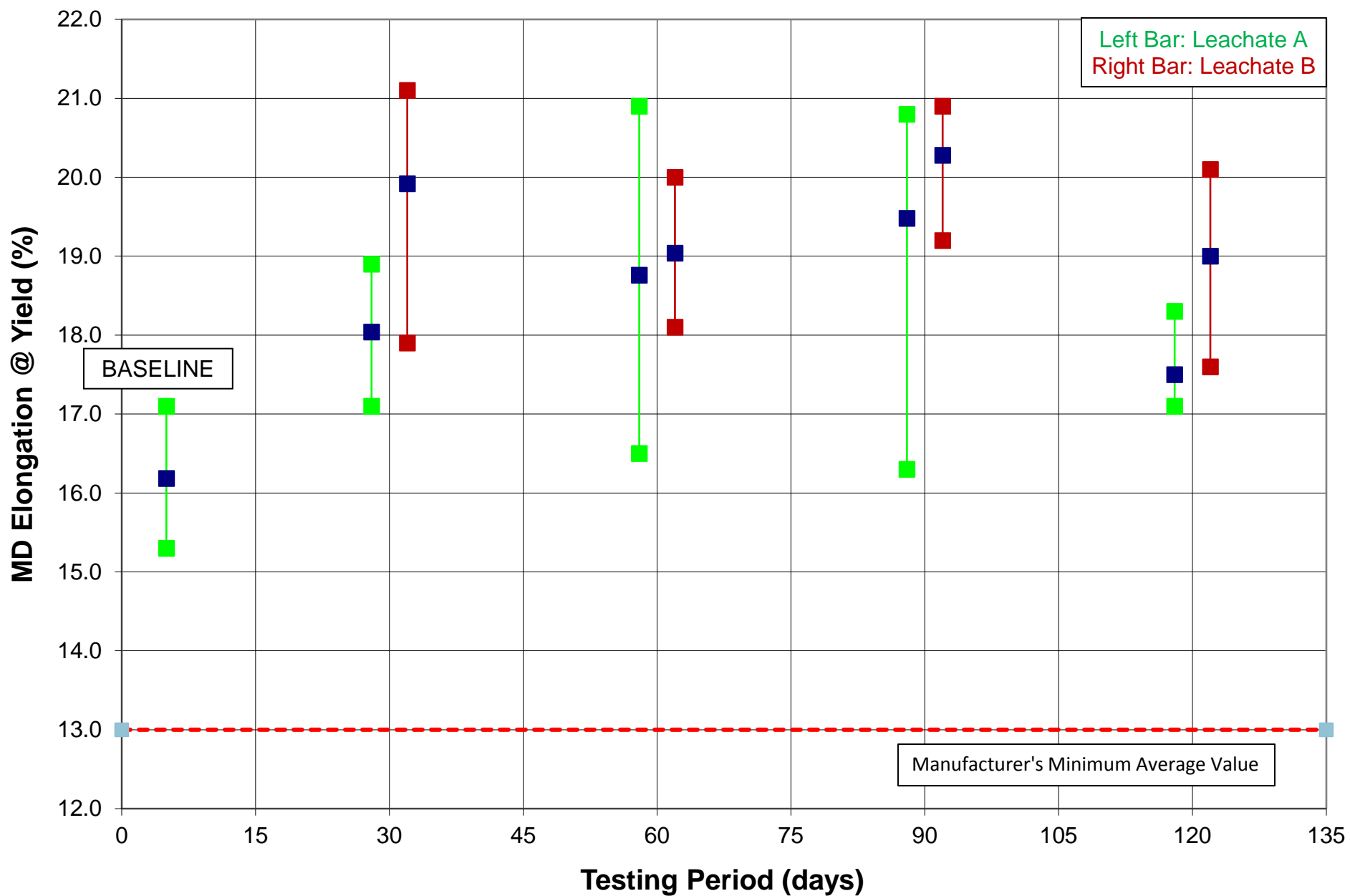
60 mil textured HDPE vs Leachate A & B





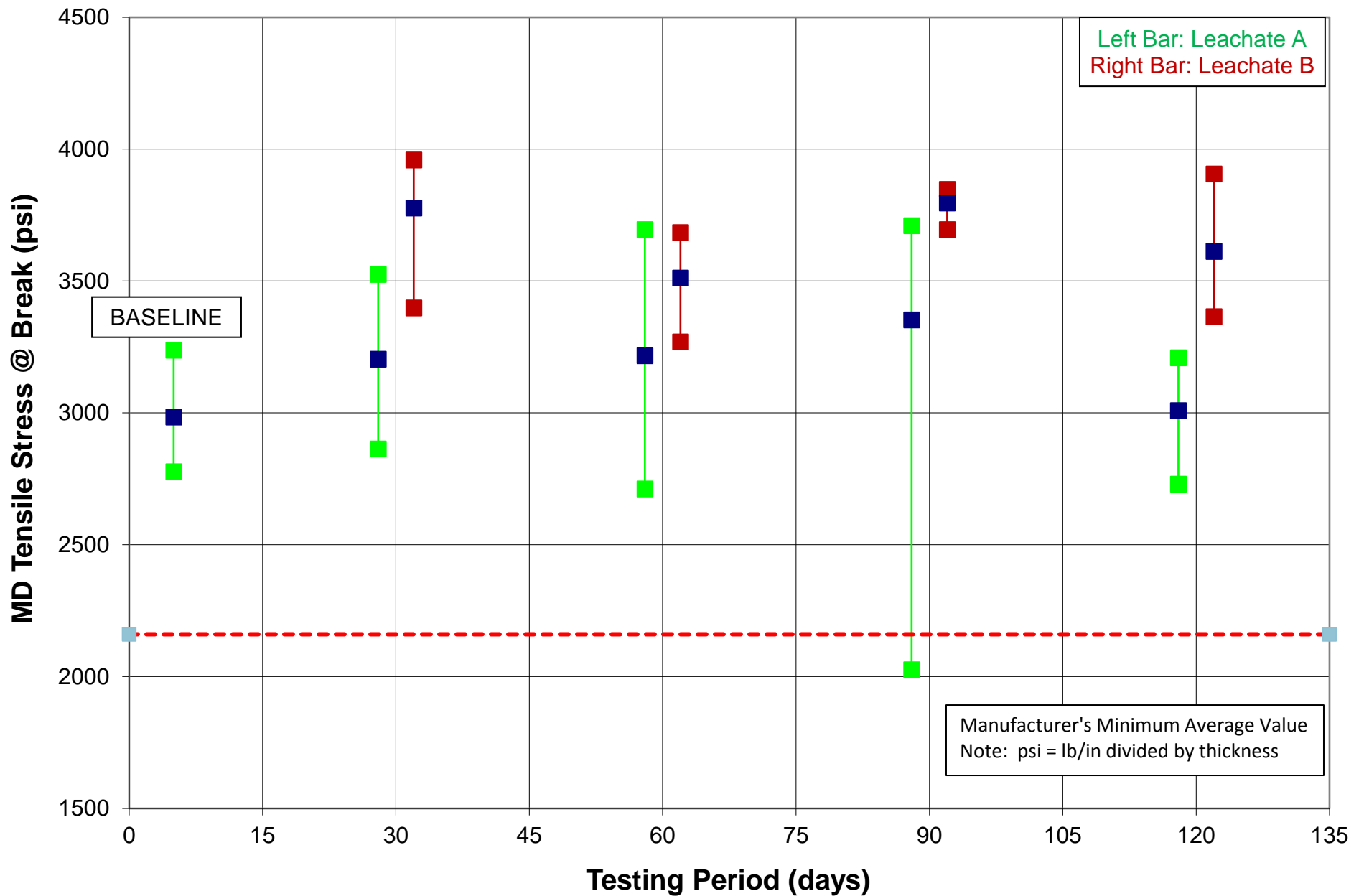
CH2MHill, Figure 2

60 mil textured HDPE vs Leachate A & B



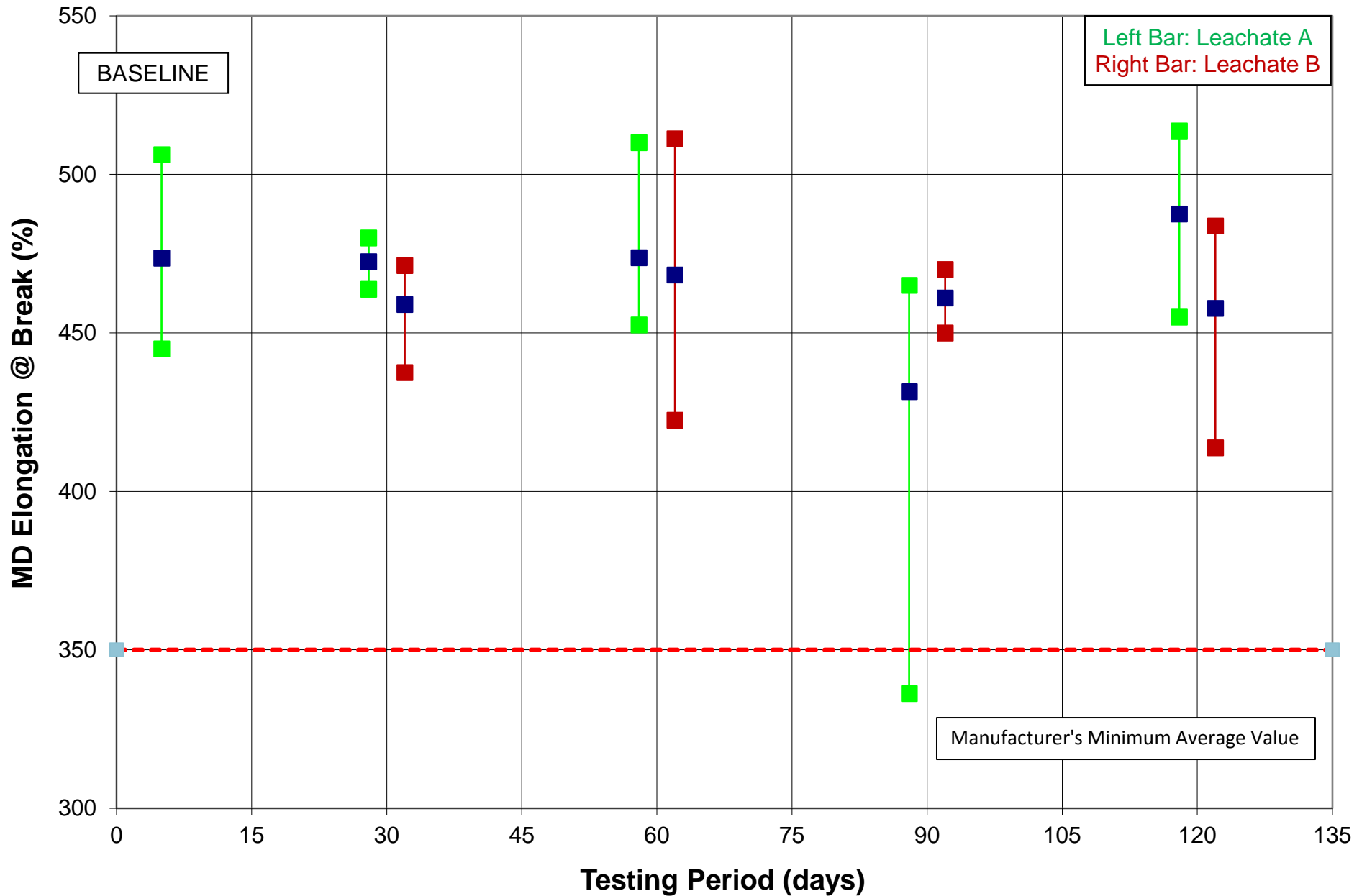


CH2MHill, Figure 3 60 mil textured HDPE vs Leachate A & B





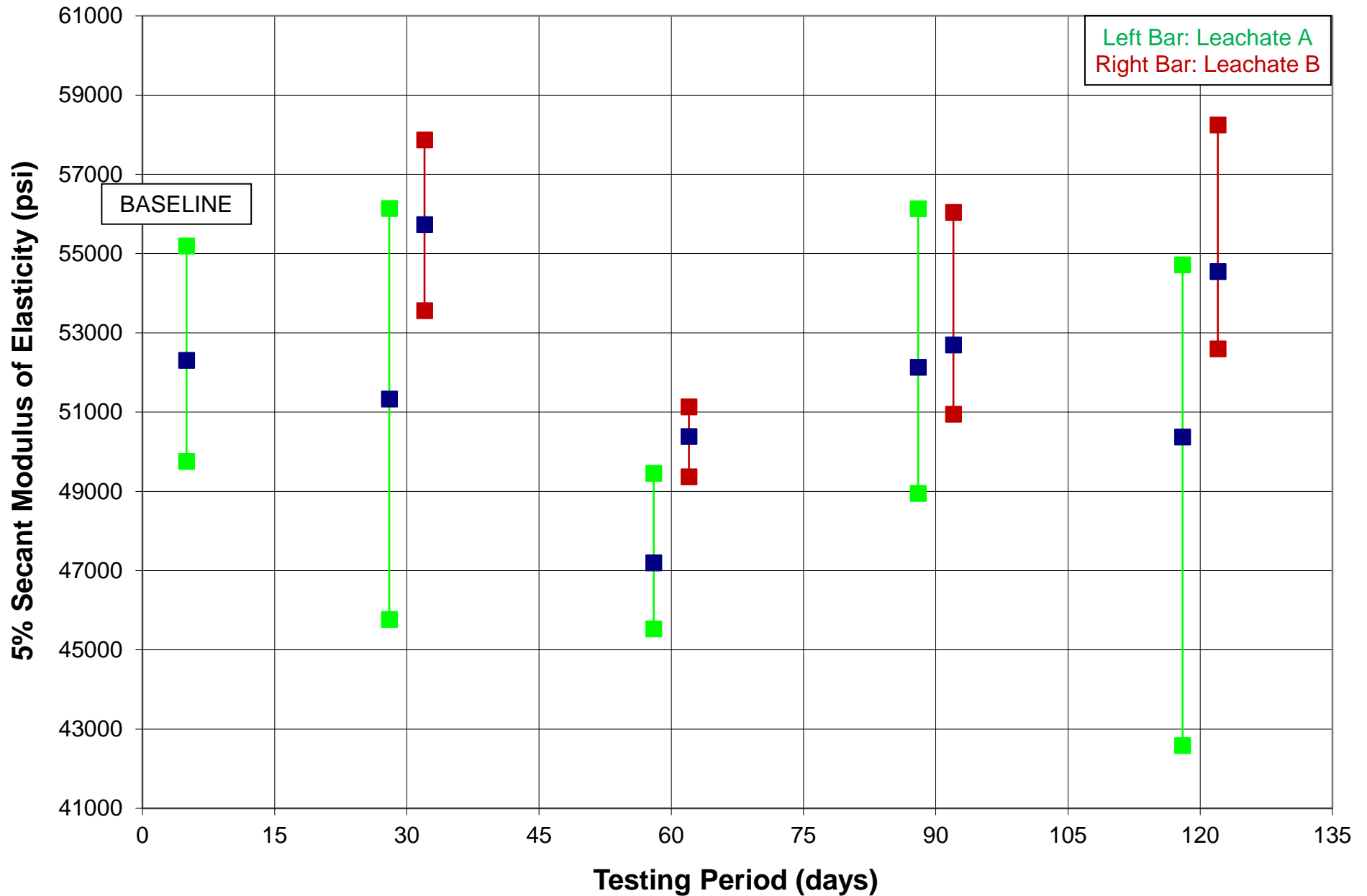
CH2MHill, Figure 4 60 mil textured HDPE vs Leachate A & B





CH2MHill, Figure 5

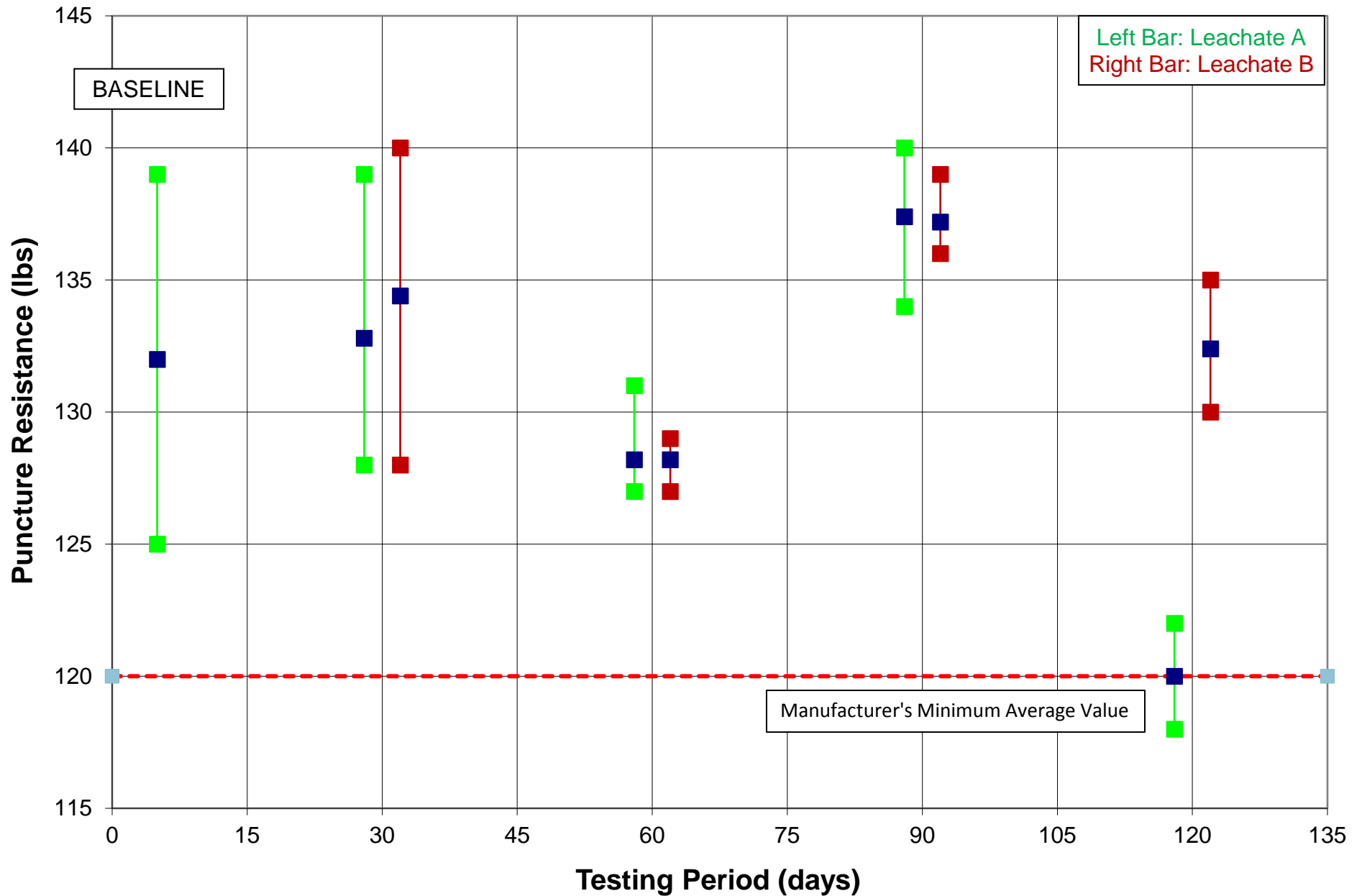
60 mil textured HDPE vs Leachate A & B





CH2MHill, Figure 6

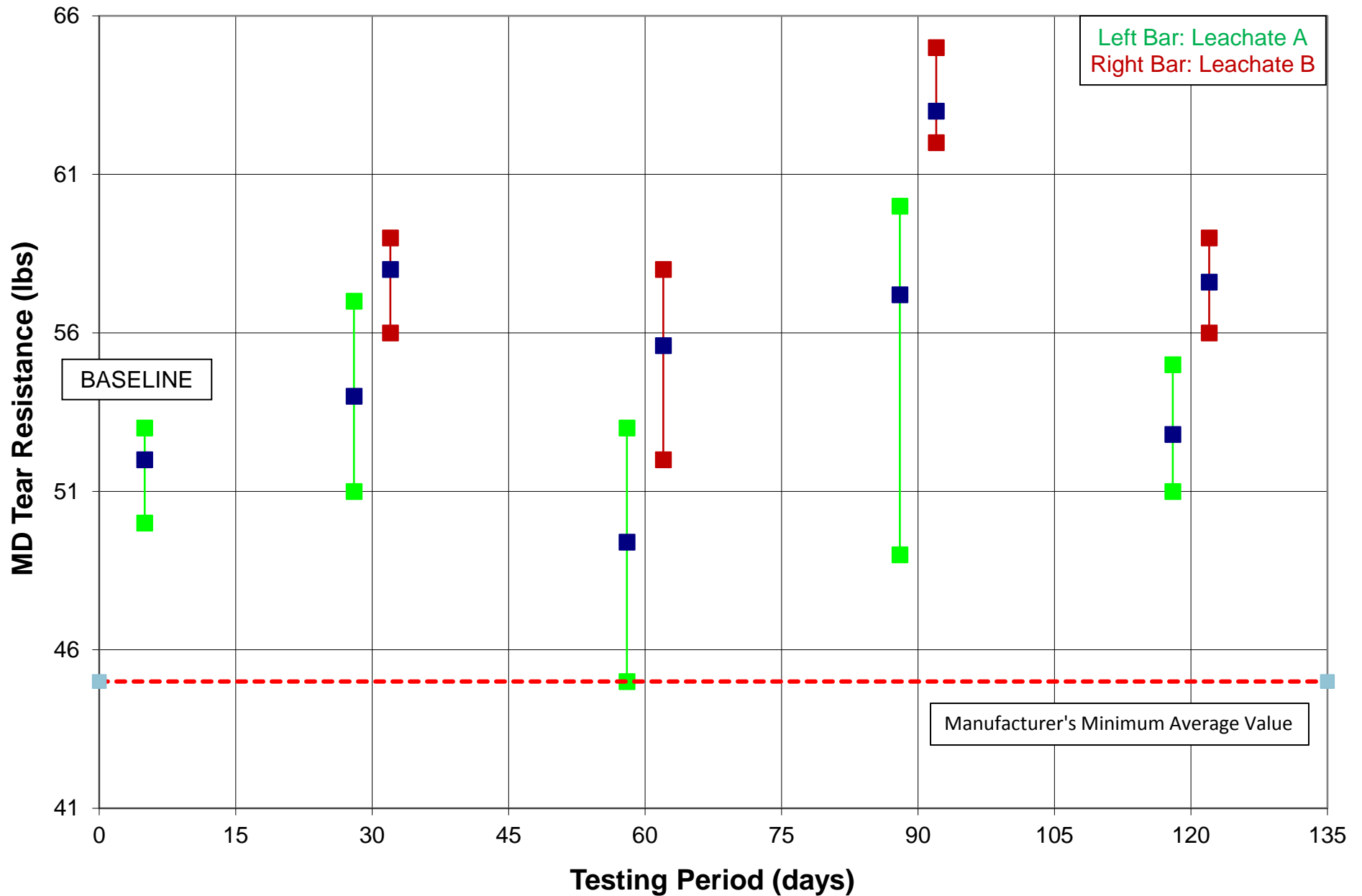
60 mil textured HDPE vs Leachate A & B





CH2MHill, Figure 7

60 mil textured HDPE vs Leachate A & B





CH2MHill, Figure 8

60 mil textured HDPE vs Leachate A & B

